THE CHEMICAL AGE

VOL LVII 26 JULY 1947 No 1463

for PERMUTIT'S ION EXCHANGERS

"ZEO-KARB" and "DE-ACIDITE"

CATION AND ANION EXCHANGE MATERIALS

When a product is being developed, the presence of small quantities of impurities may be giving you trouble and your problem may be how to eliminate these, or part of them, from the finished product. Similarly you may have small amounts of valuable substances in very dilute solution which could be worked up if they could be made available in more concentrated form. PERMUTIT Cation and Anion Exchangers, known as "Zeo-Karb" and "De-Acidite", have many applications in problems of this kind, some of which are already known, whilst others are being discovered every week. If you are one of those who have always considered Ion Exchange only in terms of water treatment, PERMUTIT Ion Exchange materials can open up a new field of application in the removal of deleterious ions or in the recovery and concentration of valuable ions without the necessity for evaporation or application of heat.

We ask you to write and tell us of any problem in which you think these materials may be of assistance, and our Research Laboratory will give you experienced and intelligent co-operation.

Write to

The PERMUTIT Company Limited

Dept. V.A. Permutit House, Gunnersbury Avenue, London, W.4

Telephone: CHIswick 6431

INDEX TO ADVERTISERS
IN THIS ISSUE

VITREOSIL

and

OTHER REFRACTORY WARE

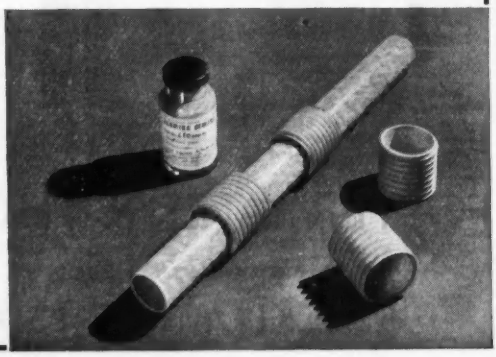
VITREOSIL, pure fused silica, Laboratory Ware and Chemical Plant are familiar to many, but others may like to know of their unique heat and acid resistance. The former is extensively quoted in standard specifications for example, and the latter is particularly applicable to acid and pure chemical manufacture because of its inertness.

Refractory materials for furnace work include VITREOSIL tubes and Alumina formers to carry electric heating windings and Alumina cements to insulate and protect these. Other refractory shapes can be made in Fused Alumina, Fused Magnesia or Zircon. Reagent Fused Alumina having declared carbon content is used in steel combustion work.

THE
THERMAL SYNDICATE
LIMITED

Wallsend, Northumberland

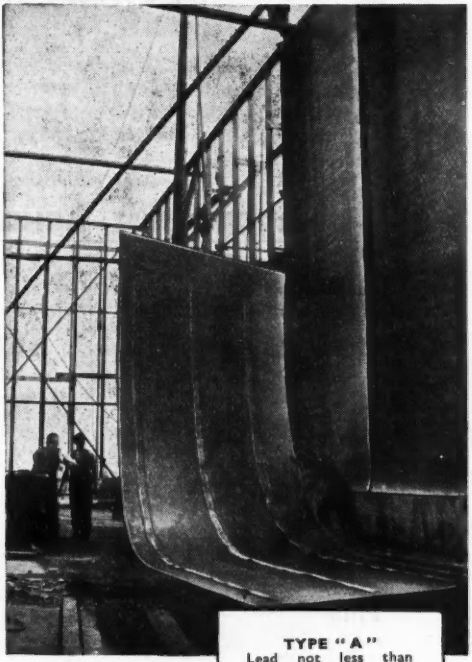
12/14 Old Pye St., Westminster, London, S.W.1



THE ADVANTAGES OF CHEMICAL LEAD-*TYPE B*

Chemical Lead Type "B" is rapidly finding favour for certain uses in the Chemical Industry where plant is subject to exceptional physical strain.

The benefits of a uniform crystal structure with no tendency to grain growth nor to intercrystalline cracking, result in greater tensile strength and give increased resistance to creep and fatigue. This guards against the effects of fluctuating temperatures and severe vibration.



Fitting Chemical Lead Sheet to Sulphuric Acid Chambers.

If you have a chemical problem why not write us?

TYPE "A"
Lead not less than 99.99% pure.

TYPE "B"
(1) Type "A" Lead to which a minimum of .06% copper has been added.
(2) Type "A" Lead to which .06% of copper and .04% of Tellurium have been added.

The above types conform to B.S.S. No. 334/1934.

ASSOCIATED LEAD MANUFACTURERS LTD
— embracing —
Locke, Lancaster and W. W. & R. Johnson & Sons Ltd • Walkers, Parker & Co., Ltd.
The Cookson Lead and Antimony Co., Ltd. • Foster, Blackett & James Ltd.
14, FINSBURY CIRCUS, LONDON, E.C.2 • CRESCENT HOUSE, NEWCASTLE-ON-TYNE • LEAD WORKS LANE, CHESTER

ALM

When it comes to foodstuffs and beverages and beauty preparations, to mention only a few products, you can't be too careful. So we're campaigning on behalf of that amazing stuff called Active Carbon. It can remove unwanted flavours and odours. It can de-colourise or improve colour. It simplifies crystallisation. It cleans precious liquids and gases. In short, it can and does improve the quality and attractiveness of many products in everyday use.

Anybody in the audience who wants to find out more about it should get in touch with the Active Carbon specialists.

SUTCLIFFE SPEAKMAN

SUTCLIFFE SPEAKMAN AND COMPANY LIMITED, LEIGH, LANCASHIRE

Telephone: Leigh 94.

London Office: Godliman House, Godliman Street, London, E.C.4

Telephone: City 9284

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone CENTRAL 3212 (12 lines)

SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970)

MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LVII No. 1463. 26 July 1947 Annual Subscription 26s. 8d. per copy; post free, 10d.

British Chemical Plant

THE manufacture of chemical plant is a highly important part of the general trade of the country and requires a very high degree of skill and experience.

That is one of the fundamental facts of which we were reminded at the recent meeting of the British Chemical Plant Manufacturers' Association, which at the same time opened up some new vistas of a great industry which urgently require to be explored.

It is in manufacturing and designing plant that the chemical engineer comes most truly into his own. He need not, of course, be associated with a plant manufacturer in order to do this. He can design his plant and have it manufactured for him by competent engineers. That method of procedure is no doubt satisfying to the chemical engineer himself, but we doubt if it represents the ideal condition. The manufacture of chemical plant should be an integral part of industry undertaken by specialists equally skilled in theory and practice.

This dictum is debatable—what point of view is not? There are many who faintly dislike the "contractor." There are, or were, technical bodies into which the man employed by a contractor was not admitted, apparently through some strange belief that he would use his membership only to promote his firm's interests. This curious Victorian survival is fast disappearing and a healthier outlook is taking its place.

The German chemical plant industry was among the great engineering industries of the country, and there is no apparent reason why British chemical engineers should not enable this country to take the place so long occupied by the Germans. To Germans the chemical plant industry was more than important; it was part of the German drive for world domination. The great manufacturing concerns of that country employed staffs of designers, chemists and engineers who were able to supply chemical plant for the manufacture of an astonishing range of products to chemical industries all over the world. Skilled propaganda convinced quite a considerable section of even informed opinion that German designers and manufacturers were second to none, and superior to almost everyone. Technical salesmen lived abroad and sold German products. The German export of chemical plant reached very large tonnages. The excellence of these plants added lustre to the German name, a lustre that was deserved so long as it was related only to the arts of peace.

The Allies are convinced that the German chemical plant industry must not be allowed in our time to be re-established, because chemical plant can so easily be diverted to the manufacture of munitions of war. Modern war is based on chemistry.

The disappearance of the German chemical plant industry will leave a gap into which we should now be rushing as air into a vacuum. Are we doing so? It is essential that this country should concentrate upon the manufacture of goods that require greater skill and experience, greater knowledge in design, than are available in most lands. The newer industrial nations can make the commonplace goods, boilers, wheelbarrows, simple castings, and so forth. The older industrial countries, such as Britain, can readily export only specialised

On Other Pages

goods. What is more specialised than chemical plant?

The annual report and the speeches of the Chemical Plant Manufacturers were good indications of the measure of the B.C.P.M.A. members' success in becoming chemical plant manufacturers to the world. It appeared that much remains to be done. The director is visiting many lands to act as the ambassador of the chemical plant industry. We have no doubt that the association members are following up his efforts by visits from their own representatives. There is nothing that sells plant more readily than personal contact. It might, moreover, be well worth while to send abroad some of the adventurous young men, now so willing to emigrate, to sell British plant, after giving them reasonable training.

The greatest obstacle in the way of developing the chemical plant industry is the difficulty of the plant manufacturer in gaining experience in the design of plant to deal with unfamiliar processes. Unit plant can generally be designed adequately from a knowledge of the properties of the materials with which it is to deal. The difficulty arises when a whole process is to be installed. A method of performing the necessary chemical reactions and physical processes can be devised, but is not necessarily the best method.

Experience has taught manufacturers of chemical plant that they can rarely specialise remuneratively in a particular type of process. We have advocated from time to time in these columns that there should be liaison between the chemical manufacturer and the chemical plant manufacturer in the design of new plant and in its performance under guarantee. There have been difficulties in the way of securing this admirable collaboration, not the least being that the chemical manufacturer may thereby give his foreign competitor a flying start. There are several ways of circumventing this; often it would be practicable for the British firm to take a financial interest in the foreign firm, or for the two to form one organisation—in which way our overseas investments could be slowly rebuilt.

In our view—perhaps here we are in advance of public opinion—whatever is the overseas policy, the chemical industry and the chemical plant industry in this country should be indivisible, or at least undivided. There will always be a majority of firms which regard chemical plant manufacture as one of many activities, for there is not enough chemical plant needed to keep a really large firm of engineers constantly employed. The time will come when this will be so, but it has not arrived yet. Such firms may be independent, or they may have relationships with those specialising in certain types of process. There will, however, always be more peculiarly chemical engineering firms able to design complicated chemical process plant, given the general know-how, and it is these firms that must collaborate most closely with individual chemical manufacturers, feeding the purely engineering firms with orders.

What type of arrangement has been made, we have no means of knowing, but, a start at least, has been made. No effort must be spared now to enable the British chemical plant manufacturing industry to take its place as the foremost of its kind in the world. We commend that idea to Sir Stafford Cripps as a plank in his export drive.

NOTES AND COMMENTS

The Celebrations End

THE end of this week will have seen the termination of one of the most memorable—and perhaps we may say hectic—fortnights in the history of chemistry. The two weeks started with the official opening of the Centenary Exhibition at the Science Museum and was followed on Tuesday by the reception by the president of the Chemical Society of delegations and guests who were taking part in the centenary celebrations—and a very colourful and pleasant ceremony that reception at the Westminster Hall was. Then came the Centenary Address, with the Centenary Dinner in the evening. At this function the head of the British Government, the Rt. Hon. C. R. Attlee, paid a warm tribute to the Chemical Society, which was echoed by speakers for the distinguished gathering. Wednesday saw the delivery of the Faraday Lecture of the society by one of the foremost chemists of the day, Sir Robert Robinson, who holds the very honoured position of president of the Royal Society. On Thursday evening the Royal Society itself played host to several thousand guests including delegates to the XIth International Congress of Pure and Applied Chemistry. That morning had seen the opening of this congress by Viscount Leverhulme and the opening of meetings of the International Union of Chemistry by Professor Bogert. This week there have been official meetings of these two bodies as well as numerous social outings and official visits to laboratories and works. We think that a lot has been crowded into these two weeks, but it has been very pleasant and instructive.

A Notable Absence

HE is a bold man these days who writes on any aspect of atomic energy. For this reason alone it is refreshing to see an article by Sir Wallace Akers on some aspects of the problem in *I.C.I. Magazine*. With the " black-out " on news of atomic research we welcome even a reiteration of knowledge which may already have been published in some journal and is therefore immune from the penalties of the Atomic Energy Act. Sir Wallace discusses the question of the use of thorium in an atomic energy plant and comes to the conclusion that given some uranium to start the reaction, the thorium plant would continue as a self-containing atomic energy unit. It is a pity that this subject and others impinging on atomic energy were not discussed at the International Congress. The silence on this subject since that remarkable document the Smythe Report has been more deafening than the reverberations of the atomic bomb itself. We venture to suggest that, as one professor has already remarked, if this document had been margined with red, marked " strictly confidential " and passed to the U.S.S.R. with a note that it was for Marshal Stalin's eyes only, the Russians would not now be so suspicious of the Capitalist West. However revealing, though, that document was —and it seemed to us to give all the information necessary for a powerful government to start up an atomic energy research programme—there have undoubtedly been many advances and refinements of method in the chemistry, physics, geology and engineering connected with atomic power. It occurs to us that as scientists find out more on these subjects their fields will necessarily widen and the number of subjects coming under the official ban will increase. We hope, with Professor Hinshelwood, that the whips of past commercial secrecy will not give way to the scorpions of military secrecy.

Practical Research

THE widespread acceptance by industrialists, student and research bodies and others of invitations issued last week by the Department of Scientific and Industrial Research to study what is being done at its Chemical Research Laboratory, Teddington, points to the probability of such visits being made annual events. A visit to Teddington was one of the more popular events provided for members of the Chemical Society in connection with its centenary celebrations and a party of about 100 accepted the invitation to tour the laboratory on Thursday. Wednesday was a " private view " day for the Press and for other groups of the D.S.I.R. and at other sessions the very lively interest of those associated with chemistry in industry has been demonstrated by the parties, necessarily restricted to about 100, which have shown a tendency to linger in some sections of the 14 specialist laboratories longer than is agreeable with the programme. Most encouraging are the evidences of the

conversion of the laboratory from its war to peacetime rôle, and the progress that is being made in dealing with the practical problems of industry, to which the laboratory's discovery of ion-exchange resins and anodic oxidation of aluminium were most acceptable contributions in the past. Emphasis at the moment lies in an equally practical direction: the prevention of corrosion of metals, on which some very interesting work was shown last week directed from the angle of inhibiting the activity of anaerobic bacteria which, by their propensity for reduction of sulphate, are potent factors contributing to the destruction of metal in clay and wet soils. The best hope at the moment seems to lie in an attack on the bacteria themselves, in which much exploratory work is visible at Teddington.

If . . . .

REMINISCENCE has been in the air lately. Events such as the centenary exhibition of chemistry and reunions in London between chemists whose paths diverged long ago have combined to remind us how far-reaching have been the results of investigations and decisions taken in the past. Perkin's resolve to continue the investigations which, just over 90 years ago, produced the first coal-tar dye is among the more obvious examples, and there must necessarily have been others, known to few, which have had almost equally decisive effects in moulding chemical history. Lord McGowan seems to have added yet another to a table of notable events in chemical industry when he publicly recorded that but for a decision by Sir Stafford Cripps shortly after World War I he, instead of Lord McGowan, might now be chairman of I.C.I. Sir Stafford, he related, who was then making his way at the bar, was invited to take charge of a partly developed site at Billingham which Brunner Mond & Co. had acquired from the Government. He decided to stick to law. The outcome, one now recalls, was that Sir Harry McGowan, who built out of the Nobel Explosives Co. (which he had joined as a junior clerk) one of the leading chemical undertakings in the world, soon had the opportunity of exercising his phenomenal flair as an organiser in the potent field created by the merger of Brunner Mond & Co., the United Alkali Co., British Dyestuffs Corporation and Nobel Industries, Ltd. Under his direction I.C.I. has become the biggest industrial undertaking in this country, with total assets of more than £140 million. The temptation to continue the analogy is hard to resist. If Sir Stafford Cripps were now its chairman, would I.C.I. control 95 very prosperous companies? And would Lord McGowan, as President of the Board of Trade, have been content to report the present crushing adverse balance of trade. . . ?

River Pollution

The Secretary of State for Scotland has called for a survey of damage effected by river pollution in Scotland and local and county authorities have been asked to submit any evidence which might justify an amendment to present regulations operating in Scotland on this subject.

A number of local authorities are understood to be preparing statements with a view to submission.

There is a possibility that this action may have been encouraged by repeated complaints regarding pollution of Border and Central Scotland rivers by trade effluents, and that any proposed legislation may have a limiting effect on the industrial concerns involved.

As others see the Centenary Celebrations

"It's a family reunion. 'Aven't seen each other for a 'undred years."

[*The Evening News*. London Laughs, by Lee.

I.C.I. DYESTUFFS DIVISION

"Empire's Largest Chemical Research Department"

"YOU cannot subdivide the field of organic chemistry and say that in this particular area we are concerned with dyestuffs and in that area we shall find rubber chemicals and medicinals. These areas overlap one another in the most extraordinary manner, and it is quite impossible to set up boundary lines."

That is one of the reasons (given in the July issue of *The I.C.I. Magazine*) to explain the diversity of activities, many totally unconnected with dyestuffs, now carried out by the I.C.I. Dyestuffs Division, which markets more than 6000 products—more than all other products of I.C.I. put together. Dyestuffs now represent little more than 60 per cent of the division's output, and textile processing and finishing materials, rubber chemicals, synthetic resins, synthetic rubber, nylon polymer and medicinal and insecticidal products are collectively almost equally important in the group which employs approximately 10,000 persons in seven factories and whose activities are controlled from Hexagon House, Blackley, Manchester.

Largest Research Department

Hexagon House, as the nerve centre, houses the largest of I.C.I.'s research departments, which is also the largest group of chemical research laboratories in the Empire. It employs nearly 600 people, of whom about 300 are qualified scientists, and is divided into six divisions, concerned with dyestuffs, medicinal chemicals, polymers, general organic chemicals, physical chemical research, and chemical engineering and operating problems. Its work can be roughly divided into three categories: (a) the discovery of new products, (b) the development of manufacturing processes for selected new products, and (c) the improvement of established processes.

Of the five major dyestuff discoveries made in the inter-war years, three—*The I.C.I. Magazine* recalls—were produced by the Hexagon House research department: Caledon jade green, Monastral blue and Dispersol and Duranol dyes, "the first complete range of satisfactory colours for acetate rayon." In other fields, the development of a process for large-scale production of mepacrine, the discovery of paludrine, the production of perspex and Methoxone selective weed killer testify to the pioneering spirit of the research department.

A specially important aspect of the work done at Hexagon House, and one which has contributed largely to the continued widening of the division's industrial services, is that provided by the liaison and research organisations thus providing a link between the laboratory work and the actual and potential use of the division's products.

"A research chemist," the article points out, "is concerned solely with chemistry. Through chemistry he is able to discover a new product and to define how it will be made. But this is as far as he goes. To decide whether and how that new product can be useful for this, that or the other purpose calls for an entirely different type of knowledge and experience.

Experts as Judges

"It needs a man skilled in the arts of dyeing and printing to decide whether or not a new dyestuff put forward by the Research Department is of any use. Similarly, a medical man must have the final say as to the value of a new drug, and so on. The service departments and the Biological Department are, therefore, the judges or referees."

The same spirit animates the operation in Manchester of the research experimental plant, which serves as a factory in miniature, designed for trying out on a small scale new processes arising from the laboratory in which the works have not already had sufficient experience. It is also used for manufactures which are still on too small a scale to be handed over to a factory.

CHEMISTRY AND RAILWAYS

CHEMISTRY is the honoured friend and helper of the railways and the products of the chemical industry are essential to their existence. This acknowledgment is made by the railway companies in the course of a study which they have just issued co-operatively, entitled "Chemistry on the British Main Line Railways."

The publication reveals the fact, not widely recognised, that the British railway companies together are more deeply concerned with chemistry over a wider field than any other individual undertaking, calling for the maintenance of large research staffs. In addition to the obviously important subjects of water and fuel utilisation, nearly every other branch of applied chemistry comes within the scope of the railways' activities and is the subject of research work by them.

Such work has usually important applications in other departments of industry, notably such things as the chemical study of paints and materials and production of improved synthetic formulations and the study and prevention of corrosion. The railways are, in fact, an important part of the country's equipment for scientific research.

OVERSEAS TRADE

OVERSEAS trading in chemicals does not appear to have contributed materially to the fair improvement in total export figures in June, equivalent to 7 per cent more than the trade secured in 1938, when allowance has been made for the increased current values. Total exports of U.K. goods last month were worth £93.13 million, the best monthly post-war total yet recorded, and compare with £65.38 million in June, 1946. Even higher, proportionately, was the increase in imports, totalling in June £153.84 million against £102.87 million a year ago. The largest individual factor contributing to the increased export were motor vehicles, which reached a new record of £14.4 million.

Chemical trading figures in June, with few exceptions, show reduced volumes, contrasted with a year before. Yet the total trading figure for chemical manufactures (excluding drugs and dyestuffs), £3,042,548, represents an increase of £143,024 above the equivalent total in June last year. Notable among the quantitative reductions of total chemicals sent overseas last month were: Sodium carbonate, 185,713 cwt. (1946, 267,768 cwt.); caustic soda, 99,443 cwt. (152,778 cwt.); sodium sulphate, 53,519 cwt. (211,011 cwt.); chloride of lime, 34,312 cwt. (69,048 cwt.), and ammonium sulphate, 17,108 tons (26,435 tons). Among the very few increased chemical exports were: Salt, 13,186 tons (10,276 tons); nickel salts, 10,657 cwt. (2226 cwt.); synthetic sodium nitrate, 7929 cwt. (4971 cwt.); disinfectants, 48,260 cwt. (42,870 cwt.), and tar oils, 3,300,276 gall. (393,603 gall.).

New Chemical Factories

WHILE comparatively few of the new Scottish industrial estate factories are directly concerned with chemical manufacture, many will offer important work to chemical manufacturers and agents in Scotland. Since VE-Day, 336 major schemes have been approved and 61 of these have been completed and production started. Some have been financed by the Government, among them the Hillington factory of Charles Tennant, Ltd., manufacturing chemicals. Among privately financed projects is the soft soap factory sponsored at Glasgow by Sadler & Co., Ltd., and the new plant for Sunshine Bleach (Hillington), Ltd., for the manufacture of bleach products. Other newly approved projects include: Boots Pure Drug Co., Ltd., a new factory of 270,000 sq. ft. at Airdrie; I.C.I., Ltd., explosives factory at Ardeer; Distillers Co., Ltd. (Kirkliston), a distilling plant of 55,780 sq. ft. at Broxburn; Auchentoshan Distillery, distillery at Clydebank of 34,000 sq. ft.; Cooper MacDougall & Robertson, Ltd., insecticide factory at Glasgow.

INDUSTRIAL ESTATES

THE Board of Trade, in consultation with Scottish Industrial Estates, Ltd., is considering the establishment of six new industrial estates in Glasgow on sites recommended by Glasgow Corporation. The provisional sites of these estates was announced by Mr. C. A. Oakley, Regional Controller of the Board of Trade for Scotland, in Glasgow last week, when he reviewed industrial developments in the West of Scotland.

In his survey of the development of new factories and the encouragement of new industries in the West of Scotland, Mr. Oakley said that in the four remaining blocks of Government factories at Linwood, Germiston, Cardonald, and Coltness, almost all the available space had been taken up. At Linwood there would be considerable expansion when a firm of steel workers from the south took over part of the factory. The arrangements, which were now well advanced, would permit William Beardmore & Co., Ltd., steel manufacturers, who occupied part of the site at present, to continue production.

Some concern had been expressed three weeks ago when it was announced that Rolls-Royce, Ltd., Hillington, Glasgow, had decided to transfer its precision foundry to Derby, said Mr. Oakley, but a Scottish firm of steel manufacturers was negotiating to take over the foundry more or less as a running concern and would continue to do precision casting there.

Negotiations were proceeding with firms manufacturing pharmaceutical drugs to establish large factories at Irvine and Ardrossan. Lord Trent, chairman of Messrs. Boots Pure Drugs, Ltd., had recently announced that his company were interested in acquiring space at Irvine in addition to the factory now under construction at Airdrie.

Business Visits to Germany

Better Facilities

AS the result of improved facilities in Germany, reports the Board of Trade, it will be possible for an increased number of business men to visit the joint U.K./U.S. zones of Germany to buy goods and services. In future all applications to visit these zones should be sent to the German Division, Board of Trade, Millbank, S.W.1, giving full details of the proposed transaction and itinerary.

Firms are reminded that trading with Germany is subject to the normal import licensing and exchange control regulations. Business men who wish to sign contracts in Germany are therefore advised to make sure before departure that the necessary import licences will be forthcoming.

Chemical Centenary and International Congress Supplement

26 July 1947

CHEMISTS AT THE ROYAL SOCIETY

NEARLY 3000 people attended one of the greatest international scientific gatherings ever held in London, when the Fellows of the Royal Society held a reception at Burlington House in Piccadilly on Thursday, July 17, on the occasion of the celebrations of the Centenary of the Chemical Society and of the meeting of the International Congress of Pure and Applied Chemistry. Delegates of some twenty-five nations attending the meeting of the International Union of Chemistry being held in the Royal Society's rooms from July 18-24 were also at the reception. Among the company were some of the delegates to the International Physiological Congress which is due to take place in Oxford later in the month.

In this special supplement will be found, in text and pictures, the story of the centenary celebrations and the meeting in London of the XIth International Congress of Pure and Applied Chemistry. This is a record of a memorable week which will live long in the annals of chemistry.

Sir Robert Robinson, president of the Royal Society, received the guests who included a number of ministers as well as ambassadors of countries represented at the International Congress. For this great occasion the Royal Academy of Arts lent its galleries and a number of other scientific societies which have apartments in Burlington House, including the Chemical Society, the Linnean Society and the Geological Society, opened their rooms.

The contributions made to early chemical discoveries by some of the Fellows of the Royal Society, such as those of Robert Boyle, Joseph Priestley and Michael Faraday, were illustrated by exhibits in the Royal Society's library.

In the rooms of the Chemical Society were hung portraits of the many distinguished chemists who have taken a leading part in the history of the Chemical Society during the hundred years of its existence. Some fifty congratulatory addresses presented to the Chemical Society on the occasion of its Centenary were also exhibited.

The Linnean Society exhibited some of the rare specimens from the collection of Linnaeus, the eighteenth century scientist from whom the Society takes its name. In addition to these scientific exhibits, guests were able to view the 1947 Summer Exhibition in the Galleries of the Academy and during the evening two short programmes of music were given by a string quartet composed of scientists in one of the Royal Academy's Galleries.

Unfortunately shortly before the reception, heavy rain fell and continued for some hours. But this did not deter the guests, whose cars and taxis caused hold-ups in Piccadilly. So many people were waiting to be received by the President of the Royal Society, Sir Robert Robinson, that queues, stretching from the Royal Society into Piccadilly on the one side and into the Royal Academy on the other, were formed.

Some of the guests waiting outside the Royal Society to be received by the President.

PRIME MINISTER AT CENTENARY DINNER

PRAISE FOR CHEMISTS

THE Prime Minister, the Rt. Hon. C. R. Attlee, was the guest of honour at the centenary dinner of the Chemical Society held at the Dorchester Hotel, London, on Tuesday last week, and which was presided over by the president of the society, Professor C. N. Hinshelwood. Over 300 well-known people in the chemical world and guests were also present to do honour to their society. They included Viscount Samuel, Sir Edward Appleton, Professor E. Berner and Mrs. Berner, Sir Alfred Egerton, Sir Henry Dale, Sir Harold Hartley, Sir Norman and Lady Haworth, Viscount and Viscountess Leverhulme, Sir Edward Mellanby, Lady Mond, Lord Rayleigh, Sir Robert and Lady Robinson, Sir Robert Robertson and Sir Henry Tizard.

Professor C. N. Hinshelwood received the Prime Minister, who was accompanied by Mrs. Attlee, while the other guests were received by the three honorary secretaries of the society, Professor W. Wardlaw, Dr. J. L. Simonsen and Professor D. H. Hey, together with Mrs. Wardlaw and Mrs. Simonsen.

Prime Minister's Toast

The Prime Minister, who proposed the toast of "The Centenary of the Chemical Society," said it was an honour to propose this toast. "Let me say at the outset," said the Prime Minister, "that among the many subjects of which I am totally ignorant chemistry takes a very high place. But then," he added, "I am equally undistinguished in the classics.

"I belong to a party," he continued, "which has had the purpose for many years of effecting great changes in our social and economic system. And it is to-day carrying out some quite considerable changes. Among the abusive terms which have been said of us is the term revolutionary. But believe me any revolutionary changes brought about or conceived by my friends and myself pale into insignificance against the revolution effected by the chemists. All the time chemists were effecting epoch-making discoveries, sometimes with disconcerting results."

Mr. Attlee went on to say that 100 years ago the chemists' contribution to our national life was comparatively insignificant. To-day it was the corner stone of the economic structure of every civilised country; indeed, the whole fabric of the world to-day, both in war and in peace, depended on the chemists. Therefore, as a mere politician he approached chemists with great reverence.

One hundred years ago coal was a convenient substitute for wood for burning; to-day it was the raw material of a number of industries, remarked the Prime Minister, and he had himself travelled around in order to see the amazing things which the chemists pulled out of coal. Years ago he had thought it was just black, but the chemists had dragged out of it all sorts of things that were white.

The chemists had had a hand in the development of the internal combustion engine, and had co-operated with the metallurgists in producing the new alloys which stood up to the intense heat and pressure of modern processes. The ladies, too, were indebted to the chemists for the synthetic materials, such as rayon, which they had produced to supplement the efforts of the humble silk-worm. An immense amount had been done by the chemists to protect our lives, in ensuring the purity of water and food supplies.

The Prime Minister also mentioned drugs, plastics and the atomic bomb as products in which the chemists played a considerable part.

All these things changed the nature of the universe, he said. The chemists, however, always expected the unfortunate politician to adapt our institutions to the discoveries they made. In their quiet way chemists asked why the rotten Government did not do this, that and the other; they were unconscious of the fact that they had caused all the trouble. The moral of it was that governments must keep in close touch with the chemists and try to obtain early news of developments.

Past Neglect

Referring to industrial use of new inventions, the Prime Minister said that great inventions had been made in Britain in the past in the realms of chemistry, but were neglected by our own people and developed overseas. He could not have that happening in the future, because the future of this country depended on our utilising to the full all the inventions and all the knowledge we could. This great country had plenty of good brains, plenty of inventions, and we had kept ahead of the other side in many things during the war.

Proposing the toast and welcoming the presence of many foreign chemists, Mr. Attlee said it was pleasing to know that at least 23 countries were represented at the celebrations of the Chemical Society to mark its centenary. He was sure that the society, which had grown to such strength from small beginnings in the past

(*Continued on p.* 131)

CENTENARY ADDRESS*

By PROFESSOR C. N. HINSHELWOOD

(President of the Chemical Society)

THE Chemical Society was founded in the year 1841. The England in which it came into being stood on the threshold of one of its greatest eras of expansion, but no one at the time could know of this, and to many the prospect must have appeared sombre and even fuller of uncertainties than that which confronts us to-day. The dislocations caused by the industrial revolution were all too obvious, but the fruits of progress were still to be gathered. The lot of the impoverished manual workers was wretched in the extreme. The scandals of child labour in coal mines, potteries and other industries were coming to light, but the Factory Acts were not yet passed, the agitation and distress connected with the Corn Laws coloured the political scene, and the demand of workers for a better mode of life expressed itself in the Chartist movement and broke forth into riots which to many people suggested that society was on the verge of revolution and disruption.

Queen Victoria was on the throne, but the splendours of her era were yet to be, and the great movements of her time would only have been discernible to those of unusual penetration. The worst social conditions depicted in the writings of Dickens still prevailed. There was nothing in the obvious character of the time to announce a period of intellectual flowering, and yet it was just then that many learned societies, including our own, came into being. Scientific studies in England were hardly in any clear way the product of their age, and sprang more from the learned curiosity of amateurs than from the conscious needs of society. There were practically no laboratories for chemical research, and little or no university instruction in chemistry.

Comparison with Today

The chemical stage was set as follows. In 1841 the time which had elapsed since the "chemical revolution" of Lavoisier was almost exactly equal to that from the discovery of radioactivity to the present day. Chemistry as a science was then as old as is now the new nuclear alchemy upon which we believe the future so largely to depend. It is difficult to-day for a scientifically educated person to realise how profound was the change of thought which followed the publication of the Lavoisier treatise. It represented a complete philosophical reorientation of ideas on the nature of substance. Two Englishmen in very different ways had played parts of the first magnitude. Priestley, whose house was wrecked by a mob, had made the discovery which opened the way for Lavoisier, and Dalton, living in an obscurity which astonished his foreign visitors, had formulated the theory upon which all future development was to depend.

Between the time of Dalton and the foundation of the Chemical Society the great forward sweep of organic chemistry had begun, but in this the English school had played little part, as was explicable in a country which tended to produce a few of the finest flowers of science, art and literature without any very vigorous general growth of leaf and root. At the moment of our foundation Dalton was still alive, but Liebig, who visited England at about this time, found little in the world of chemistry to inspire him. Yet Faraday was at the height of his powers and his great work on the laws of electrolytic action was already accomplished. Its full implications were far from obvious to his contemporaries, and indeed the confusions which Avogadro's paper of 1811 might have cleared away still clouded chemistry. On the Continent the great battle between the rival interpretations of the structure of organic compounds was at its height.

Faraday and Graham

At about this time much was being done in England to lay the foundations of physical chemistry, not only by Faraday with his work on the liquefaction of gases and on electrochemistry, but also by the original and versatile Thomas Graham, first president of the Chemical Society

Such was the chemical scene at the time of our foundation. If the curtain is raised every 20 years the following is seen. By 1861 chemistry had seen two decades of steady progress but had been on the whole unshaken by revolutionary changes. Cannizarro's paper of 1858 had removed one of the major obscurities and Frankland and Kekulé had placed structural chemistry on a firm foundation. In this country Hoffman, Mansfield, Williamson and Frankland are seen among the outstanding figures of the period. In England it was still mainly the affair of the amateur. Indeed, in 1867, the only technical education in Leeds, with its quarter of a million inhabitants, was provided by one teacher who worked in a cellar

(*Continued on p.* 120)

* Delivered at the Central Hall, Westminster, July 15, 1947.

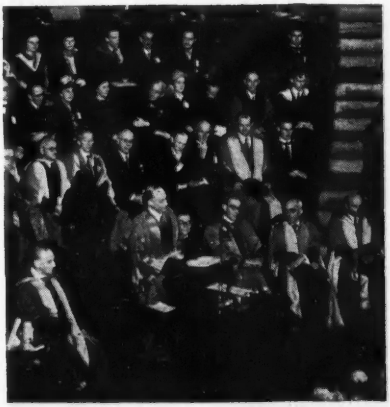
RECEPTION AT

On this and the next page are photographs taken during the impressive and colourful ceremony at the Central Hall, Westminster, when Professor C. N. Hinshelwood received delegates from home and foreign societies who gathered to present addresses of congratulation to the Chemical Society on reaching its hundredth birthday. Some of the delegates also brought welcome gifts. The reception of the delegates, most of whom were in academic robes, was one of

Part of the gathering at the Central Hall.

CENTRAL HALL

the most charming and picturesque ceremonies seen in London. The lower pictures on these two pages show the presidential procession, headed by the mace-bearer with the president immediately behind entering the hall to receive the addresses of congratulation. On the left Professor Hinshelwood is seen addressing the gathering, and on the right a general view of part of the platform after the delivery of the congratulatory messages.



The Presidential procession entering the Hall.

Celebrities at the Centenary Dinner

Mr. Attlee is greeted by Prof. W. Wardlaw.

Prof. C. N. Hinshelwood in conversation with Mr. and Mrs. Attlee.

A group of notabilities, including Sir Robert Robertson, Sir Harry Lindsay, Sir Edward Appleton, Mrs. Pauling, Prof. Pauling, Sir Harold Hartley, and Prof. J. N. Bronsted.

(Top left, from left to right) : Dr. F. M. Hamer, Mrs. J. L. Simonsen, Miss Thomas, Dr. M. A. Whiteley and Dr. E. Chu, at the morning reception.

(Top right) : Dr. L. H. Lampitt (central figure) at the Centenary Dinner. To his left are his Guest and Sir Robert Pickard, while Mrs. Jean Irvine and Mme. Delaby are seated to his right.

(Right and below) : Further shots taken at the Centenary Dinner.

I.C.I. DANCE AND CABARET

Connaught Rooms Reception

THERE was a happy gathering at the Connaught Rooms, London, on Wednesday of last week when the directors of Imperial Chemical Industries held a reception for delegates of the Chemical Society Centenary Celebration and the XI International Chemical Congress. Over 1400 people were present to dance and watch the cabaret.

Among the many notabilities present were: Prof. C. N. Hinshelwood, president of The Chemical Society, Sir Robert Robinson, president of The Royal Society, Col. M. T. Bogert, president of The International Union of Chemistry, Prof. R. Delaby, International Union of Chemistry's secretary, Dr. L. H. Lampitt, president of The Society of Chemical Industry, and the following directors of I.C.I.: Lord Ashfield, Sir Wallace Akers, Dr. C. J. T. Cronshaw, Dr. A. Fleck and Mr. W. F. Lutyens.

Owing to the indisposition of Lord McGowan, I.C.I. chairman, guests were welcomed by Lord Ashfield, who later addressed them at the microphone. He spoke of Lord McGowan's deep disappointment at being unable to attend, as he had been looking forward to the event with great enthusiasm. Lord Ashfield extended an especially cordial welcome to delegates to the Eleventh International Congress of Pure and Applied Chemistry.

The dance floor presented a colourful scene as guests danced to Tommy de Rosa's orchestra. Caution was thrown to the winds when cabaret artistes Georges André Martin, and Clayton and Shires performed their acts. Carried away by enthusiasm, the audience dispensed with formality and ignored the dignified restraint and conventions more usually associated with functions at the Connaught Rooms by standing on the plush-seat chairs and leaning forward on the shoulders of fellow guests.

The occasion was an unqualified success, and one that does credit not only to Mr. F. W. Pratt (who organised it) and the directors of I.C.I., but to the organisation as a whole. Catering arrangements were exemplary. To sum up: Connaught Courtesy—Chemical Conviviality.

VISIT TO BRITISH DRUG HOUSES

One of the items in a notable programme of the Centenary Celebrations was a visit of more than 100 delegates to some of the departments of The British Drug Houses, Ltd., on Wednesday, July 16.

The importance of fundamental research in influencing progress in the discovery of new therapeutic agents, was fully demonstrated in the physiological, biochemical and pharmacological laboratories and the spacious, well-equipped new organic chemistry research laboratories recently completed for use. Among the many operations shown, the large-scale manufacture of pure vitamins and of vitamin concentrates proved of particular interest.

The complex apparatus and processes necessary in the preparation of the synthetic oestrogens, stilboestrol and dionoestrol attracted much attention.

Delegates subsequently lunched at the Café Royal at the invitation of the directors of The British Drug Houses, Ltd. Among the notable visitors present were Professor W. H. Mills, past president of the Society, Dr. H. H. Hatt (Australia), Dr. V. C. Barry (Eire), Professor T. S. Wheeler (Eire), Dr. and Mrs. Krishna (India), Professor R. Delaby (France)), Dr. and Mrs. H. G. H. Erdtman (Sweden), and Professor O. Achmatowicz (Poland). Professor W. H. Mills, on behalf of the Chemical Society, thanked the directors of the company for the opportunity to visit the plant and for their hospitality, while Mr. F. C. Oscar Shaw, managing director of B.D.H., replied.

Kodak Works Tour

A party of 32 delegates to the Centenary Celebrations of the Chemical Society visited the Kodak Research Laboratories on Wednesday, July 16. The party included Dr. C. W. Shoppee, member of Council for the Society, who proposed the vote of thanks, and Mr. R. M. Winter, Controller of Research for I.C.I.

Mr. E. R. Davies, director of research, Kodak laboratories, welcomed the visitors in the conference room where were exhibited colour prints, transparencies, graticules, templates, publications, etc. After a short talk by Dr. H. Baines on the chemical work of the laboratory (with special reference to the basic principles of emulsion making), the party made a tour of the laboratories seeing the tricolorimeter, shutter testing machine, developer analysis, sensitometry, continuous processing machine, the works laboratory (silver analysis) and finally, the Kodak museum.

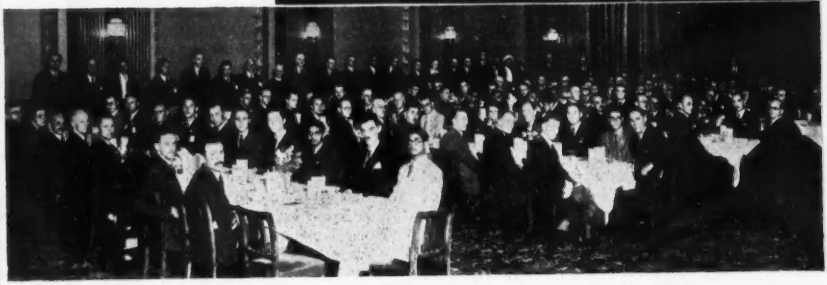
Happy scenes at the I.C.I. Dance and Cabaret:

Top: The dance floor.

Centre (top): An entertainer amusing guests with dancing dolls.

Centre (below): Guests watching the cabaret.

Following a visit to the laboratories of British Drug Houses, Ltd., a party of the delegates to the International Congress of Pure and Applied Chemistry was entertained to lunch at the Connaught Rooms by the directors of B.D.H. The photograph (below) shows the guests at lunch.



INTERNATIONAL CHEMISTS IN COUNCIL

CONGRESS AND UNION CONFERENCE OPEN

"IN the name of my country and on behalf of the Executive Committee of the Congress I extend to all of you a very warm welcome." With those words Lord Leverhulme, as president, opened the 11th International Congress of Pure and Applied Chemistry at the Central Hall, Westminster, last week.

Viscount Leverhulme

After expressing his appreciation of the honour done to him in naming him president of the congress and of the delegates' attendance, notwithstanding the difficulties of international travel, Lord Leverhulme said: "Another international chemical congress is long overdue and, but for the war, this congress would have been held in London no doubt in 1941. There is thus a great leeway to be made up, and to the need for this congress the number of papers —some 1500—and their quality and importance amply testify.

"It is out of these things, and from the sectional meetings, and also from the addresses of distinguished men of science that the results of this meeting will emerge and bear fruit for the future. But we must not forget another factor—the revival of old friendships and the forming of new ones, and the great value to be derived from all those informal contacts, discussions and interchanges of views and experiences which take place outside the formal setting of the conference hall

"The part that chemistry plays in the life of man is now more clearly seen than ever, and, while I do not believe that chemistry can explain the whole of man, it is most certainly true to say that it is to chemistry that we now turn for an explanation of most of our bodily processes and of the brain's reaction to outward influences and stimuli; phenomena which at one time did not seem to have any connection with chemistry at all.

"While chemistry has advanced our understanding of our bodies, it has at the same time enormously increased our power to heal them—or to help our bodies to heal themselves—and chemistry has thus prolonged life and added to the happiness of mankind through the alleviation of anxiety and pain.

"In the inorganic sphere the progress has been no less remarkable. A man must indeed be devoid of imagination who does not see in this congress an immense opportunity for helping civilisation still further."

International Union of Chemistry

The ceremony of opening the 14th Conference of the International Union of Chemistry, which followed, was performed by Professor Marston T. Bogert, president of the conference, who is representing here the U.S. National Research Council, the National Academy of Science, the American Institute of Chemists and Columbia University of the City of New York. Having congratulated the president and officers of the International Congress on the success which had crowned their preparatory work, Professor Bogert described the ready co-operation which had aided the revival of the work of the International Union.

"Sir Robert Robinson," he recalled, "visited the United States during the summer of 1945 on a scientific mission for his country, and in the course of that visit we met in Boston to exchange views on the future of the International Union of

Professor M. T. Bogert

Chemistry and to plan how best to conduct the campaign for its rehabilitation. Sir Robert reported the apparently unanimous opinion of the chemists then present in London that the attempt should be made

(*Continued on p.* 131)

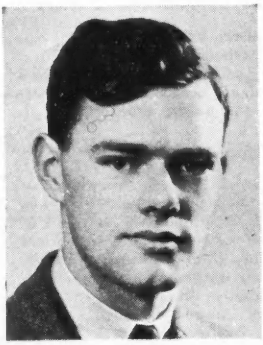
PERSONALITIES AT THE CHEMICAL CONGRESS

Dr. A. Goldberg (U.S.A.).

Dr. G. Batta (Prof. of Ind. Chem., Léige University).

Dr. R. Houwink (Holland).

Dr. W. Mitchell (Sec., Section 14).



Dr. D. Faulkner (U.K.—"Elastomers and Plastics").

Dr. J. Walker (Medical Research Council).

Dr. C. J. Koenig (U.S.A.—Director of Research, American Nephalene, Ltd.)

Prof. von Euler (President, Swedish National Committee for Chemistry).

(*Continued from p.* 111)

and held a class in chemistry, receiving a grant of £11 a year for the purpose.

Some of the great trends of chemistry in the next 20 years are reflected in our *Journal*. One of the most splendid phenomena had been the flowering of the great tree of organic chemistry.

In 1901 the death of Queen Victoria symbolised the end of an epoch. It was a time of intellectuual and social unrest and uncertainty: agriculture had collapsed, industrial struggles had acquired a new bitterness.

By this time the health of chemistry in Britain was much more robust, and schools of research were gradually coming into being in many of the universities. Tilden in 1904 told the Chemical Society that he considered the science to be flourishing. A glance at the *Journal* of 1901 certainly shows a great variety of activities which range over investigations on alkaloids, bacterial actions, optically active nitrogen compounds, absorption spectra and the synthesis of methane.

The transformation by 1921 was colossal indeed in every aspect of life: profound political changes, an unprecedented degree of mechanism and all the febrile aftermath of what then counted as the greatest war in history.

The Chemist's War

The war of 1914-1918 had brought profound changes to British chemistry. It has often been called the chemist's war. Unprecedented needs of explosives, chemical warfare agents and other products of industry had forced an improvised expansion, which, by a fortunate dispensation of providence, gradually merged into an orderly and continued evolution.

The raising of the curtain for the last time on the actual centenary date of 1941 disclosed a scene of chaos and destruction. Two decades of fruitful progress seem to have been brought to a tragic end. In some ways the two decades had been among the most productive that chemistry had known. Modern theories of valency had brought an immense clarification into the whole system of inorganic chemistry: the subtleties of organic behaviour had been penetrated, and the intimate mechanism of chemical changes in general stood largely revealed. There had been a powerful cross fertilisation of chemistry with physics and mathematics. And on the human side the developments were no less vigorous.

One of the unmistakable trends of the past century has been the successive decline of different aspects of individualism: the independent craftsman, the aristocratic politician, the empire-building explorer all departed from the scene. In science a similar trend has been visible though at a lag of several decades. At the time of our foundation the stage is dominated by the amateur, whether a Cavendish or a Faraday: later the individual is more and more frequently dependent upon the university or technical college, small and independent but none the less a community. Then the great research associations appear and the State subsidy becomes indispensable. Two great wars intensified and accelerated the collective process in the world of science until to-day we are faced with the problems presented by vast industrial research laboratories and by State enterprises undertaking work which is inconceivable without the co-ordinated efforts of hundreds of men of science. The great question is what is to be the fate of the individual in the world which has emerged.

In this matter something of an idealogical battle has been engaged, and the question is one of moment for the future of an independent scientific society.

Individualism and Controls

Complete individualism means chaos, which is only given form by something analogous to an energy factor—by State compulsion, or by powerful emotional forces. If any of these controls are applied too vigorously the result is order indeed but the order of utter stagnation. Just as nature strikes her subtle balance, so it must be here. Nothing is less fruitful than doctrinaire argument about freedom and planning. The vast achievements of military regimentation in wartime have been cited as examples for peace, but in this it is forgotten that results in limited spheres have had to be bought with an utter disregard of cost, whether of money, happiness or life.

A hundred years ago we saw an individualist society faced with the task of controlling the industrial revolution: at the beginning of a new century we face a task which seems even greater, that of preventing an organised society from turning individuals into slaves. The problem involves the relation of the State to science, of the industries to the universities, the organisation of research laboratories, and indeed the relation of every man of science to the laboratory in which he works and to the science as a whole.

Those who call themselves planners are often, I think, not conscious enough of the art and effort involved in large scale action. Even with the most admirable motives and goals operative complexity often brings frustration. There is need for a complete new science, a kind of biological and psychological statistical mechanics to clarify those matters.

One very welcome sign of the past few years has been the increasing number of scientific papers published from the chemical

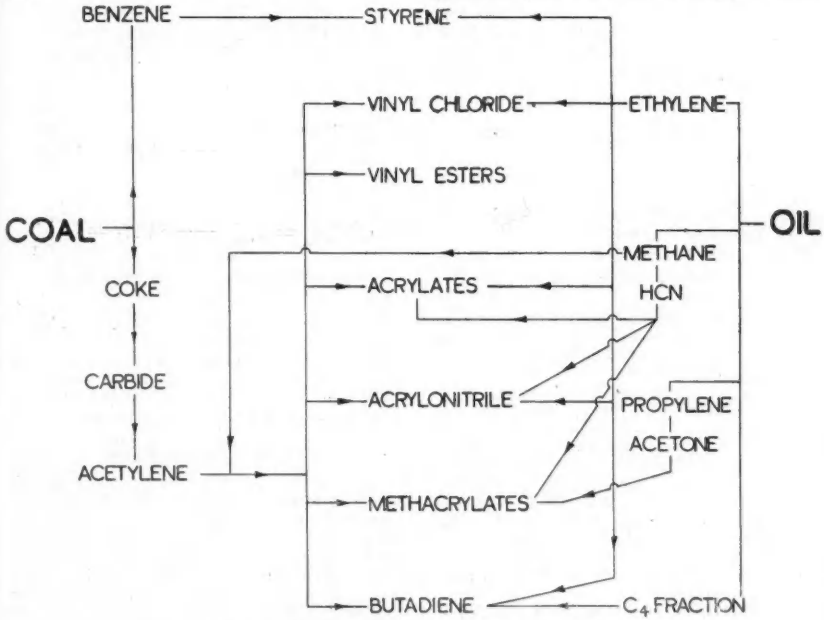
(*Continued on p.* 131)

St. Andrews Symposium

VINYL COMPOUNDS

By J. H. BROWN

THE compounds with which I shall be dealing to-day are certain mono- and asymmetrically di-substituted ethylenes, which have assumed considerable importance in recent years, in consequence of the fact that they may be polymerised to synthetic resins which are finding ever-increasing applications. I shall endeavour to deal, as far as possible in the time at my disposal, with their synthesis and technical production.



Vinyl Compounds from Coal and Oil

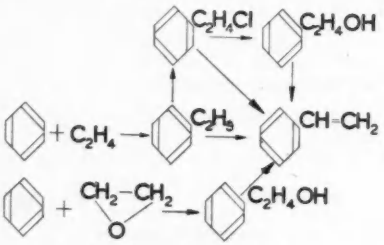
For the synthesis of these compounds, three fundamental synthetic methods exist. The first consists in the elimination of two radicals from adjacent carbon atoms. One of these radicals is usually hydrogen, and the other may be hydrogen, halogen, hydroxyl, carboxyl, amino, etc. Many examples will be brought out later. The second method consists of the addition of HX to acetylene. This is a most useful method, and the addend may consist, for example, of a halogen acid, HCN, alcohol, or an organic acid. The third method consists in taking a compound already possessing the vinyl structure, and modifying the substituent groups.

Styrene

The first compound with which I wish to deal is styrene. This is an aromatic hydrocarbon, boiling point 146°. It has been known since 1831, when it was obtained by Benastro by the distillation of gum storax. Production on a large scale has been developed only in the last fifteen years, and latterly has been greatly accelerated by the synthetic rubber programme. Many thousands of tons are manufactured annually in both the United States and Germany. The quantity of this material obtained in coal tar distillation is below the world requirement, and further, the compound is difficult to isolate in a state of purity. For all practical routes, the raw materials are benzene and ethylene, to give different saturated de-

rivatives, from which styrene is obtained by the use of the first of the general methods for the synthesis of vinyl compounds. In passing, it may be mentioned that many attempts have been made to synthesise styrene by the addition of benzene to acetylene, but these have met with no success. Ethylene and benzene react in the presence of aluminium chloride, to give ethyl benzene. This may be chlorinated and the chloroethyl benzene dehydrohalogenated to give styrene, or it may be hydrolysed to the alcohol and this dehydrated. Alternatively, the alcohol may be produced from benzene and ethylene oxide.

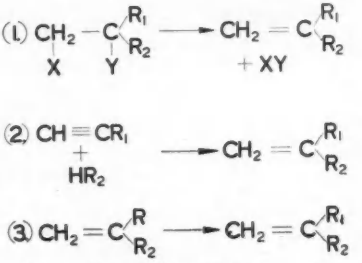
A more direct process has, however, been developed. It is the dehydrogenation of ethyl benzene, and appears to be that most widely used for the production of this com-



Synthesis of Styrene

pound. In this process benzene and ethylene are fed to the base of an enamel-lined tower, into which aluminium chloride is supplied at the top, the temperature being maintained at about 104°C. A 50 per cent excess of ethylene is used. The reaction product passes to a separator whence some aluminium chloride is returned to the reactor. After washing with water and caustic soda, and drying with solid potassium hydroxide, the product is distilled in a set of continuous stills, and the pure material fed directly to the dehydrogenation vessel, where it is contacted with a catalyst consisting of a mixture of zinc, aluminium, calcium and magnesium oxides, at a temperature of 650°C. Gases formed in the reaction are purged off, while the liquid product is separated into an aqueous layer which is discarded, and a hydrocarbon layer, which is refined in a series of five stills, whence benzene, ethyl benzene, etc., are recycled to appropriate points in the plant. This is just one example of the care necessary to get pure products which will give satisfactory and reproducible results on polymerisation. Each of these five columns was of the order of 60 ft. high and contained 30-40 theoretical plates.

I should next like to discuss the production of vinyl chloride. This compound, a gas, condensing to a liquid at - 12°C., has been known for over a hundred years, but again only during the last two decades has it been produced in quantity. Annual world production now exceeds 50,000 tons. The available methods of synthesis are simple and restricted in number. All start from acetylene or ethylene as raw materials. From ethylene, vinyl chloride may be made either by direct chlorination at elevated temperatures under which condition substitution becomes the prominent reaction, or by a two-stage process involving normal addition chlorination to ethylene dichloride, and subsequent elimination of HCl from the latter, either by pyrolysis or by the action of alkalis. While some commercial production may be achieved by these means, there is little doubt that in the main, most vinyl



Formation of Vinyl Compounds

chloride is manufactured by the direct addition of HCl to acetylene, which is an easy and convenient process, conversions of close on 100 per cent being attainable, with no undesirable side reactions or by-products presenting difficulties in separation.

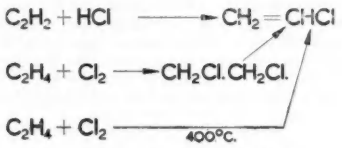
Vinyl Chloride Plant

In a typical plant for this process acetylene is cooled, dried and metred and HCl also metred to a mixer from which the mixed gases enter the reactor where they are contacted with a catalyst consisting of mercury chloride deposited on active charcoal. The temperature is controlled to a maximum of 200°C. to prevent excessive volatilisation of mercury, either by oil circulation or by water boiling under the appropriate pressure. These reactors are of multi-tubular construction, to permit dissipation of the large amount of heat evolved. Catalyst life varies from days to months, and is dependent on the rate of throughput, and on the purity of the incoming acetylene. The gases leavng the convertor are scrubbed by water and aqueous alkali to remove HCl, and the product isolated by continuous distillation in two stills operating at atmospheric pressure. The first of these separates out a small amount of ethylidene chloride at the base, while the second

removes acetylene as head product along with a small amount of vinyl chloride. The product is, of course, obtained from the base of the second still.

Vinyl Esters

Although I shall deal now more specifically with vinyl acetate, it should be remembered that most of what I have to say may be applied by analogy to other vinyl esters. Compared with the two previous



Synthesis of Vinyl Chloride

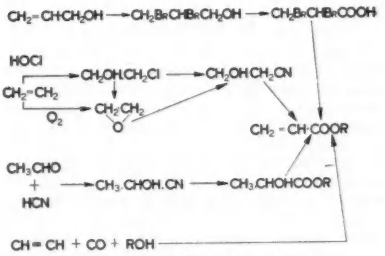
compounds, vinyl acetate is a relatively recent discovery, being first made by Klatte in 1912, and polymerised by him in 1917. Since its production is based exclusively on acetylene as a raw material, it is not surprising to find that the material was first developed in Canada and the United States, where plentiful water power made adequate supplies of carbide available, and where it has been produced in quantity since 1920. Present world production exceeds 50,000 tons/annum, but I am not aware of its commercial production in this country. The compound is produced exclusively by the addition of the acid to acetylene, but two important variations of the process appear to have been used to approximately equal extents.

North American production seems to be based mainly on a liquid phase reaction, in which acetylene is passed into a stirred reactor, fed with acetic acid containing mercuric sulphate as a catalyst. The temperature must be controlled to below 30°C. to avoid excessive formation of ethylidene diacetate. The absorption is not complete, and the exit acetylene is cooled to remove the vinyl acetate, and recycled. The condensate is distilled and the acetic acid recovered is recycled to the process. The vinyl acetate is further refined by distillation and so is the by-product ethylidene diacetate. The mercury catalyst loses activity and is renewed either periodically or continuously. It is claimed that up to 100 lb. of vinyl acetate may be produced per lb. of mercury used.

In Germany, on the other hand, a vapour phase process, operating at a relatively high temperature, has been developed. Acetylene and acetic acid vapours are preheated to 170-200°C. in a series of heat exchangers, and the gases passed to a convertor containing a catalyst of active carbon impregnated with 70 per cent of its weight of zinc chloride. The convertor is again of shell and tube construction, to allow for the heat removal, the temperature being maintained at around 200°C. Catalyst life varies from 6 weeks to 6 months, according to the output, and the best conversion is 30 per cent of acetic acid and 15 per cent of acetylene. The exit gases pass *via* heat exchangers to the condenser system, and the acetylene is recycled. The condensate, consisting of 40 per cent vinyl acetate and 60 per cent acetic acid, passes to the centre of a fractionating column from the base of which acetic acid is recycled. The 97 per cent vinyl acetate coming off overhead, goes to the second column in which the aldehyde is removed at the head, while vinyl acetate leaves the base and is refined in a final still. Despite the low conversions, recycling of all unreacted materials leads to an overall yield of 90-95 per cent.

Acrylic Acid and Esters

Acrylic acid and its esters represent another series of vinyl compounds which has been known for a very long time. Its subsequent development is largely due to the work of Rohm who first polymerised the acid in 1912, and proposed the use of the polymeric esters in lacquers in 1915. There are many possible routes to these compounds. First we have the old route, starting from glycerol, which was converted to allyl alcohol by well-known methods, and thus into acrylic acid by the steps shown. More recent and more practicable methods use ethylene as starting material. This is converted to ethylene cyanohydrin by one



Synthesis of Acrylic Esters

of the two routes shown, and hydrolysis of the nitrile group accompanied by dehydration leads again to acrylic acid. A superficially attractive route is that from acetaldehyde *via* the cyanohydrin, but the latter is not readily converted to acrylate and circuitous routes are necessary to accomplish this step. Finally, it has recently been learned that Reppe, working for the I.G. in Germany, has solved the problem of the addition of CO and water to acetylene, to

give acrylic acid directly. This interesting reaction has been accomplished by the use of nickel carbonyl in conjunction with acetylene under pressure.

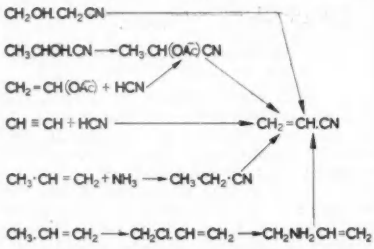
Of these processes, that most widely used in technical practice are those based on ethylene. The processes, by which ethylene chlorohydrin is made and converted to ethylene oxide, are too well-known to require description here, though it is interesting to note the possibility of oxidising ethylene directly to ethylene oxide, as has been done in Germany. Ethylene oxide is converted to the cyanohydrin by reaction with HCN, in the presence of lime at room temperature. Yields are good, and the product is used without purification in the further stages of the process. The conversion of the cyanohydrin into acrylates is accomplished by reaction with sulphuric acid and the apppropriate alcohol. The reactor consists of a lead-lined pot, surmounted by a tile-lined tower. Methanol is fed to the pot and 78 per cent sulphuric acid and cyanohydrin enter the top of the tower. The temperature of the pot is 150°C. The vapours pass through a dephlegmator at 78°C. and then into a second vessel containing water at 95°C. The vapours then pass up a column, down which water at 75°C. is fed. This washes out methanol and the distillate from this tower is 80 per cent methyl acrylate. This is washed again in a similar vessel, giving 90 per cent ester. The condensate from the dephlegmator of this tower is separated into an upper layer of 90-95 per cent ester, while the aqueous layer is returned to the pot. The two products are combined and finally purified by batch distillation.

Acrylonitryle

There have been rapid developments in connection with acrylonitrile recently, as it is a constituent of some types of synthetic rubber, and because the polymer can be drawn into fibres. Also the compound is extremely reactive, and is finding increasing application as a synthetic intermediate. As would be expected, the methods of synthesis bear some relation to those used for the synthesis of the acrylates, though in addition, some special methods are available. Thus, ethylene cyanhydrin and acetaldehyde cyanhydrin can, by appropriate measures, be dehydrated to yield acrylonitrile. The production of the latter intermediate from vinyl acetate is interesting. Of the methods not related to acrylate synthesis, the most important is the direct addition of HCN to acetylene, but recently, other routes based on propylene as a raw material, have received some consideration. The latter may be aminated directly to yield, as one constituent of a complex mixture, propionitrile, or alternatively, converted to allyl amine *via* allyl chloride. Acrylonitrile is formed from either of these two intermediates by dehydrogenation.

For the industrial manufacture of this compound, two methods are of equal importance, that from ethylene cyanhydrin and the direct addition process. In the former, cyanohydrin is produced by one of the methods already described when dealing with the acrylates, and a number of alternatives have been proposed for its dehydration to acrylonitrile. In early work, phosphorus pentoxide was used, but this was not very practicable. Catalytic methods are now preferred, tin deposited on charcoal, or conventional dehydration catalysts such as alumina having been used, at temperatures in the range 225-500°C.

The direct process appears to have been



Synthesis of Acrylonitrile

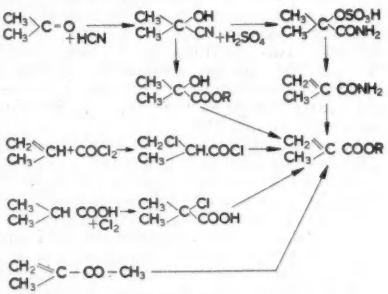
that most widely worked in Germany. Purified make-up acetylene is mixed with recycled acetylene and enters a reactor containing an acid solution of cuprous ammonium chloride. HCN is admitted at a point half-way up the reactor. A ten-fold excess of acetylene is present in the circulating gases, though the make-up is on an equimolar basis. The exit gases from the reactor are scrubbed with water in a tower, and are recycled, the purge being controlled to keep the content of vinyl acetylene at not more than 15 per cent. The weak solution of acrylonitrile so formed, is stripped with steam in a second tower. The issuing vapours are condensed, and the condensate separated into two layers, of which the lower aqueous layer is returned to the column, while the upper organic layer passes on to the still system. Due to the complicated mixture to be separated—there are present (in addition to acrylonitrile), acetaldehyde, HCN, monovinyl acetylene, lactonitrile, divinyl acetylene and others—the still system is rather complicated. The first still removes acetylene and other volatile impurities. Water is removed by an ingenious system of sidestream withdrawal, and continuous separation. Acrylonitrile, with high boiling impurities, flows from the base of this still to a second still, where pure acrylonitrile is taken as head product, and the high boilers concentrated at the

C.A.—St. Andrews' Symposium THREE

base of this still to a second still, where pure acrylonitrile is taken as head product, and the high boilers concentrated at the base, whence they pass to a third still, running under reduced pressure, to strip out the last traces of acrylonitrile from the high boilers. This acrylonitrile is contaminated with HCN arising from deposition of the lacto-nitrile and is recycled to the first still.

Methacrylates

We now come to another important class of vinyl compounds in methacrylic acid and its esters. Here again, the past few years have seen an enormous increase in the manufacturing capacity for this material, an increase which has arisen mainly from the use of the glass-clear methyl methacrylate polymer in aircraft. These compounds are relatively inaccessible, and a variety of



Synthesis of Methacrylic Esters

round-about methods have been proposed for their synthesis. Most of these are impracticable for large scale operations, either on account of the unavailability of the intermediates, or else because the processes give poor yields. Such are the processes *via* hydroxy-isobutyric acid, *via* isobutyric acid, from propylene, by the action of phosgene, or by the oxidation of isopropenyl ketones. The only method used in large scale manufacture is that from acetone, in which the cyanohydrin is reacted with sulphuric acid, to yield methacrylamide, from which the free acid or esters are obtained by hydrolysis and esterification.

The process for methyl ester manufacture is carried out batchwise. In the first step, HCN is added to acetone, under the influence of an alkaline catalyst, in reactors equipped with brine cooling, to maintain a temperature below 40°C. When addition is complete, the temperature is lowered, and the equilibrium fixed by acidification at -15 to -20°C. The cyanohydrin so prepared is added in the next stage to sulphuric acid, cooling again being applied to maintain the temperature at around 80°C. The amide sulphate which is so formed is then heated to a temperature of 120°C.-150°C., when sulphuric acid is split off, yielding methacrylamide. The crude amide so formed, is now esterified by refluxing with water and methanol, either in the same vessel, or in a separate vessel. The mixture is then steam distilled and the distillate washed with brine or water, and distilled batchwise at reduced pressure. Stabilisers such as hydroquinone may be added to the column to prevent polymerisation.

Butadiene

No discussion of vinyl compounds, would, I think, be complete without some reference to one compound, production of which, far exceeds the total of all other plastic intermediates, and in fact, probably exceeds 1,000,000 tons annually. I refer, of course, to divinyl, better known as butadiene. The tremendous importance of this compound is evidenced by the enormous amount of effort which has been devoted to its synthesis and is reflected in the large number of practical processes. An early process started from benzene or phenol, which were converted by appropriate steps into cyclohexene which on pyrolysis yielded butadiene and ethylene. These rather clumsy methods have given way to others in recent years, though they have the great advantage of yielding a crude butadiene which does not present great difficulties in purification. Several alternative processes use alcohol as a raw material. Russian and Polish workers claim the direct conversion into butadiene using catalysts, details of which have not been disclosed. American workers have been unable to duplicate these results. Alternatively, ethanol may be converted to aldehyde by oxidation or by dehydrogenation over copper catalysts, and this again may be converted into butadiene by two alternative processes. In one of these aldehyde is condensed to aldol, this reduced to 2.3-butylene glycol which is dehydrated to give butadiene. In the alternative process aldehyde is converted to crotonaldehyde and this is reacted with ethanol to give butadiene, acetaldehyde and water. By the use of catalysts consisting of tantalum oxide on silica gel, the latter two reactions may be caused to proceed simultaneously, this in effect providing a process for the conversion of alcohol into butadiene.

Yet another series of processes starts from acetylene as raw material. This may be converted into aldehyde, the rest of the process being as already discussed, it may be polymerised to vinyl acetylene which on hydrogenation yields butadene, or in the recently disclosed German process, may be reacted with formaldehyde under pressure, in the presence of a catalyst of cuprous acetylide to give butinedol, which is reduced

to tetramethylene glycol, and this in turn dehydrated to yield butadiene. Butyl alcohol, obtained from fermentation processes, has also been used as a raw material. This is reacted in turn with HCl and chlorine to give a mixture of dichlorobutanes, which is converted by dehydrochlorination into butadiene.

By far the most important source of butadiene, however, is the C_4 fraction obtained from oil cracking processes. In come cases, special modifications have been made to the cracking process to increase the amount of butadiene formed directly, but even so, this is inadequate, amounting to not more than one-sixth of the American production. The greater part of the butadiene (over half the American production) is produced from the other C_4 hydrocarbons, by subsequent processing. Thus, butane is dehydrogenated to butene and this may be further dehydrogenated to give butadiene directly, or alternatively may be chlorinated from butadiene, obtained by dehydrochlorination of the resulting dichloride.

In conclusion, it is appropriate to return to the central theme of this meeting the dependence of modern synthetic chemistry on oil and coal. Many examples of this dependence have already been quoted. Considering the compounds purified from coal, it is noteworthy that, with the exception of aromatic derivatives, all routes to the vinyl compounds with which I have been dealing, pass through the key intermediate-acetylene —*via* coke and carbide. In the case of oil, a wider range of initial steps is used, since all the hydrocarbon fractions from C_1 toC_4 have been used directly or indirectly in the synthesis of vinyl compounds. Most of the chemistry we have been discussing belongs to the last twenty years, and it seems not unreasonable to suppose that we have much to discover in this rapidly growing field. The plastics chemist will become interested in new vinyl intermediates, and I am confident it will not be beyond the skill of the organic, synthetic and technical chemists to devise sound, economical routes to the synthesis of these new compounds. When they do, however, it is reasonably certain that the basic raw materials will be oil or coal.

Tin Stocks in May

A small reduction during May in U.K. tin stocks held by the Government is shown in figures just issued by the Ministry of Supply. Ministry stocks of 7021 tons at the beginning of May had fallen to 6763 tons at the end of the month. Production represented 2529 tons, 357 tons went for export and 2430 tons were distributed to firms in this country, whose stocks on May 31 are estimated to have been approximately 3815 tons, an increase of about 89 tons.

SIR WALLACE AKERS ON ATOMIC ENERGY

WRITING in the July issue of the I.C.I. *Magazine*, on the utilisation of atomic energy, Sir Wallace Akers, research director of I.C.I., says that it seems likely that there will be an atomic power plant working in America by 1949, while within five to ten years we may expect to see atomic power stations beginning to take their place alongside coal and oil-fired electrical generating plants. What the cost of electricity from an atomic power station will be, is, he says, a matter of guesswork, although it is reasonable to suppose that the cost of atomic power will be brought down until it is competitive with the cost of coal-generated power.

Sir Wallace Akers describes how thorium could be utilised in an atomic pile. This element resembles U238 in its ability to capture a neutron without undergoing fission, and forms an unstable isotope which then loses two electrons, by conversion of two neutrons in the nucleus to protons. The new element has 92 protons and is therefore, a new isotope of uranium with atomic weight 233, *i.e.*, U233.

This artificially made istope is fissile, like U235, by fast and slow neutrons. Hence the rather scarce uranium could be supplemented by the much commoner thorium by converting this into U233, which can be done by placing thorium or some compound of it, in the outer layer of a working pile so as to catch some of the neutrons which would otherwise escape. The U233 could be separated from the unchanged thorium by chemical methods. It is possible, thinks Sir Wallace, that a self-sustaining U233-thorium pile could be built. If this is practicable then, having once made some U233 from thorium in a uranium pile, energy could be generated and maintained, using only thorium as the raw material.

£14,000 SAVED ON WAR STOCK

SUCCESSFUL salvage at the Government depot at Bishopton, Renfrew, of a surplus of 10,000 tons of sulphonic acid mixture, used by the Navy to lay smoke screens, has saved an expenditure of some £10,000 in disposal costs. The chemical was to have been dumped in the sea at a cost of £10 per ton. The recovery of sulphuric acid for agricultural fertilisers and of hydrochloric acid for industrial purposes was approved and a method achieved whereby the Bishopton staff, under Mr. H. Sellick, completed the salvage of the mixture. Profit on the acids alone was some £1000 while empty drums realised £3000 per 1000 drums.

OXYGEN PRODUCTION IN THE U.S.A.

From our Peripatetic U.S. Correspondent.

IT is impossible to go very far in the chemical and metallurgical industries in the U.S.A. at the present time without hearing discussions about "tonnage oxygen." The immediate query arises as to the actual prospects of making oxygen available in large quantities and at cheap rates for various processes. The answer to that question may be sought in one of two main fields—in the old-established oxygen producers or in the newcomers to this industry. A rather interesting conflict of interests has arisen in this connection. On the one hand the old-established oxygen producers appear to be adhering to the policy of maintaining the manufacture of oxygen in their own hands and continuing the lucrative business of selling liquid oxygen in large tank car lots. For many consumers, both actual and potential, this represents the most convenient arrangement, although the price of the product is high. With a minimum figure of about $2 per 1000 cu. ft. for large deliveries, the prices of liquid oxygen are comparable with those prevailing in Britain.

Important Newcomers

As a result of the extensive work done in perfecting both portable and static oxygen plants during the war, a great deal of general engineering knowledge of the plants and processes of manufacture has been fairly widely disseminated. In consequence, there are a number of important newcomers to the oxygen field, whose interests are mainly in the engineering side of the industry. Such firms are primarily concerned with the manufacture of oxygen plants intended for sale to the various industries using oxygen. These newcomers to the field are offering a very wide range of plants ranging from comparatively small units with capacities of 200 cu. ft. per hour up to the gigantic new plant now under construction at Brownsville, Texas, with a rated capacity of 48,000,000 cu. ft. or 2000 tons per day. The primary function of this plant is to provide oxygen for the controlled combustion of natural gas in a reaction of the Fischer-Tropsch type to produce petrols, diesel oils, lubricating oils and waxes, with unsaturated hydrocarbons as by-products. In a plant of such magnitude —the rated capacity of natural gas to be processed is 66,000,000 cu. ft. per day—a very large oxygen plant integrated completely with the process is an essential.

The steel industry is also an extremely important large-scale consumer of oxygen. Very large quantities are used daily for various processes, and a vast potential market may be found if some of the new experiments being carried out in the open-hearth process fulfil their initial indications. In many of the processes in the steel industry the demand is intermittent or is characterised by the occurrence of decided "peaks" in the demand curve. Under these conditions the adoption of an integrated plant may not prove quite so attractive. These constitute the main fields of development of the future—processes characterised by a relatively steady demand for oxygen over the whole 24 hours and, on the other hand, those fields where the demand is intermittent. In the first case the installation of integrated plants appears the most reasonable solution, and in this field the newcomers to the oxygen business appear to be progressing favourably. Rivalry is rather keener in the second field and the course of future developments is rather difficult to foretell. An interesting pointer to future developments is furnished by the very recent announcement that the Linde Company of the U.S.A. has opened at Tonawanda, N.Y., a plant with a rated capacity of 200 tons or 4,800,000 cu. ft. of oxygen per day. This plant is only a few miles from Niagara Falls, N.Y., the centre of a very large and complex network of chemical industries. For several years past the Union Carbide and Chemical Company, of which the Linde Company is a wholly-owned subsidiary, have been engaged in the manufacture of calcium carbide and supplying the acetylene by pipe-line to the various chemical manufacturers in the neighbourhood. It appears a reasonable surmise that this new large-scale oxygen plant may develop along similar lines, supplying liquid oxygen in tank cars to certain consumers, while gaseous oxygen may eventually be piped to other consumers requiring larger or more continuous supplies.

Economics the Deciding Factor

In some respects such an arrangement offers distinct advantages to consumers such as the steel firms, who are not possessed of the technical staff and labour required to run such a plant. The deciding factor must be economics. If the prices charged by the firms supplying oxygen to the various firms by tank car or pipe-line are too far out of line with those eventually proved possible by the integrated plants, then what is at present a lucrative business will suffer a serious decline. The challenge to the engineering newcomers to the oxygen field is to perfect the development of oxygen plants with "push-button" control, capable of being operated for long continuous periods without much technical supervision. Experience gained during the war along these lines has proved of great value.

M-V's EXHIBITS

AT the Chemical Society exhibition held in the Science Museum, London, S.W.7, last week the Metropolitan-Vickers Electrical Co., Ltd., demonstrated the company's work in the field of molecular distillation.

Molecular distillation permits heat-labile substances to be purified or separated at the lowest permissible temperatures, and also allows the partial separation of substances (*e.g.*, isotopes) of different molecular weight but similar vapour pressure.

Fats, waxes and petroleum derivatives are among the many substances that can be distilled in this manner. Vitamin A concentrates, which decompose in conventional apparatus, are produced commercially from fish liver oils by this process. In 1928, petroleum derivatives of high molecular weight were investigated in the Metropolitan Vickers Research Laboratories by C. R. Burch, who obtained various fractions which have extremely low vapour pressures at room temperature. They are widely used as diffusion pump fluids and as sealing media in high vacuum equipment and are known as the "Apiezon" range of low vapour-pressure products.

Another M-V exhibit was the short-path batch still used in the company's research laboratories by C. R. Burch in his original discovery of high vacuum distillation for the producton of low-pressure petroleum derivatives. The material to be treated is placed in the tray, the requisite vacuum produced, and the temperature of the tray raised progressively. The several fractions are then collected in turn in the glass test-tubes.

Anniversary

The 25th anniversary of the Coastwise Petroleum Company of Baltimore, Ohio, was celebrated on July 1. Beginning operations in 1922 by the assembling and storing of benzol, toluol, xylol and similar products in a small way, the company grew until in the years just before the war it was the major exporter of these chemicals. Millions of gallons of British coal-tar products found their way, during the war, to the company's plant at Goodhope, New Orleans, where they were fractionated. Recently exports to Europe of various chemicals in bulk have been resumed.

Official Notice

Oils and Fats

The Ministry of Food advises that no changes will be made in the prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period July 20, 1947, to September 13, 1947.

THREAT TO PENICILLIN PLANT

The penicillin factory operated by Glaxo Laboratories, Ltd., at Barnard Castle, Co. Durham, may have to be moved to another part of the country. This was stated by Sir Harry Jephcott, chairman of the company, at the Ministry of Health inquiry recently into the refusal by Barnard Castle Urban Council to deal with the factory's effluent of up to 25,000 gal. a day without an indemnity against damage which might be caused to the disposal works. Over 500 people are employed in the Glaxo fermentation factory, which cost £500,000 to build in January, 1946, and produces much of this country's penicillin. Glaxo Laboratories are now spending £20,000 a year to remove the effluent by tankers to the sea at West Hartlepool.

Small Rise in Coal Production

The average weekly output of deep-mined coal last month showed a small improvement on the figure for the last four five-day weeks in May and was fairly substantially larger than the corresponding figure in 1946. Average weekly output in June was 3,623,900 tons, against 3,516,800 tons weekly in May and 3,394,300 tons in June, 1946. These facts, and an increase of 2½ million tons in distributed stocks in June (compared with an increase of 1 million tons a year before) and a sustained rise in output per manshift to a little more than 1.8 tons, are the best features of the summary issued this week by the Ministry of Fuel. Less reassuring were evidences of rising absenteeism (to 5.84 per cent voluntary absentees, against 4.65 per cent in May) and a reduction in the rate of recruitment to the mines, the total mining force now numbering 717,500, compared with 714,600 in May.

New Recovery Plant Stops

Because an allocation of fuel is unobtainable, it is impossible to operate a £70,000 caustic soda recovery plant recently installed at a paper mill to deal with foam which often floats down Manchester rivers. This was reported on July 15 to a meeting in Manchester of the Lancashire Rivers Board. With few exceptions, said a report to the committee, the bad "condition" of most rivers and streams in the area was not attributable to discharges within the Manchester boundary. "In proportion to its size, the Irwell and its tributaries are reputed to be draining one of the most highly industrialised areas in the world, with the result that there is no clear water at all in this river when it reaches Manchester."

Canadian Chemical Notes

From Our Canadian Correspondent

A PROJECT which is capable of revolutionising Canadian production of fertilisers has been broached in the Canadian Senate by Senator J. A. McDonald, former Nova Scotia Minister of Agriculture. The senator claims that the large phosphate deposits in the Saguenay district of Quebec could be transformed into soil fertiliser at a cost of $5 a ton, compared with the $14 which Canadians are currently paying for imported phosphates. Canada is expending over $10 million annually for imported fertilisers and the senator contends that the funds spent on import freight subsidies on these imports alone would have been sufficient to develop the Saguenay deposits, as well as others. Other large phosphate deposits have been found in New Brunswick and good quality potash in Saskatchewan. The sulphuric acid needed for the all-Canadian industry could be produced from a native calcium sulphate found in New Brunswick.

* * *

Shortage of three principal fertiliser elements—nitrogen, phosphorus and potassium—is adding to the world's hunger problem. Many of Europe's main fertiliser plants were destroyed by bombing and other sources in the United States and Canada were cut because the three main elements are also important ingredients of munitions. Canadian fertiliser plants fell 20 per cent short of the country's demands this year, Mr. G. S. Peart, fertiliser administrator for Canada, has announced. At the same time, output was at least twice as great as that of five years ago. Good food crop prices have brought increased demands for fertiliser from farmers. Had their needs been fulfilled, the output of canning crops alone would have been at least 3 per cent greater this year. Canada supplies more than enough nitrogen for her own needs, using only 20 per cent of her production domestically. About two-thirds of the country's phosphorus needs are also home-produced, but all potassium must be imported. The Dominion imports potassium and phosphorus from the United States and, two months ago, received also 6000 tons of potassium from the Russian zone of Germany and a shipment of phosphorus from Holland. European fertiliser prices, however, are too high in comparison with those of Canada and the United States, said Mr. Peart. Unless these prices come down before next spring, imports from Europe are considered unlikely.

* * *

Characteristic evidence of the growth of chemical industry in Canada is the $10 million building and expansion programme undertaken this year by Canadian Industries, Ltd. Mr. Irving R. Tait, chief engineer, has revealed that work is already under way on several of the 12 main projects located at Toronto, Windsor, Kingston, Hamilton and Nobel, in Ontario, and Shawinigan Falls and Brownsburg, in Quebec. Notwithstanding Canadian Construction Association records which state "building costs are nearly double the 1939 level and demands for both material and labour far exceed supply," it is expected that most of the programme, undertaken to meet consumer requirements, would be completed this year. The main construction drawback has been lack of steel resulting from production interruptions in the eastern United States. Bricks also are scarce. Details of the building programme are: Toronto: Newest of the company's paint plants will be the finishes works located on an eight-acre site on outskirts of Toronto. Groundwork was laid for the $2 million undertaking a year ago and paint production is expected to start this autumn.

* * *

Substantially increased sales of industrial alcohol have offset rising production costs, shareholders of Commercial Alcohols, Ltd., were told at the annual meeting of the company in Montreal. Output so far this year is well in advance of corresponding figures in 1946 and the annual total seems likely to be correspondingly larger. The limiting factor is the molasses supply which will not be sufficient for the rest of the year's programme for production of alcohol; grain will be imported to maintain continuous operation.—Canadian Industrial Alcohol Co., Ltd., of Montreal, intends to make a "special distribution" to shareholders out of $2,360,493 received from its subsidiary, Robert McNish & Co., Ltd. This amount, it is stated in a letter to shareholders, represents 60 per cent of the amount due from the Scottish subsidiary, and transfer of the funds has been approved by British authorities. As there are 1,111,916 shares outstanding, the amount involved represents over $2 per share. The exact amount to be distributed is not yet known. The announcement is made in a letter which shows earnings for the nine months ended May 31, 1947, were $1,094,822, or 98 cents per share against $819,306 or 75 cents in the like period of last year. Operating profit was $1,798,301 against $1,665,421, other income $365,979 against $182,414, and tax provision $980,688 against $943,629.

A CHEMIST'S BOOKSHELF

A Century of British Chemistry. By F. Sherwood Taylor. London: Longmans Green and Co., Ltd. 1947. Pp.35 + IV. 1s. 6d.

Paradoxically, among the most topical additions to the current book list is one concerned very largely with what was happening in chemistry upwards of 100 years ago. The explanation of the anomaly is, of course, the recent celebration of 106 years' work by the Chemical Society, with which the publication of "A Century of British Chemistry" coincided. It gives an excellent short survey of the work and reasoning which had produced such revolutionary results in chemistry and industry in the past 100 years and of the tenacious and adventurous minds which pioneered those paths. The authorship, by the curator of the Museum of the History of Science, Oxford, whose exceptionally wide aquaintance with his subject has been proved by previous publications on science history, and the co-operation of Professors C. N. Hinshelwood and N. V. Sidgwick, are sufficient evidence of the book's credentials.

Wood Pulp and Allied Products. By Julius Grant. London: Leonard Hill, Ltd. 1947. Pp. 300 + XII. 35s.

As a relief from repeated evidences of dwindling resources of essential raw materials, it is gratifying to turn to a material which abounds in vast areas of the earth and, given adequate means of collection, could supply almost all the essential requirements and many of the luxuries of civilisation. Timber, of which this writer has made a wide study in considerable detail in its uses as wood pulp, fills that description. By the co-operation of the chemist wood fibres had been made to perform virtually miracles of transmutation before war stopped the free exchange of information, while accelerating research in many countries to multiply the number of vital substances into which wood pulp can be converted and to improve the chemical and mechanical processes. In this second edition of the book which he first published in 1938, Mr. Grant has greatly enlarged the picture to include many more recent developments of the "cellulose age" and the addition to the title of "and Allied Products" is indicative of the recent further widening of the field of research of which he provides a valuable summary.

George Washington Carver. By Rackham Holt. London: Phoenix House, Ltd., 1947. Pp. VII + 304. 15s.

As a corollary to the dictum that "the proper study of mankind is man" we offer —with appropriate diffidence—the proposition that men of science themselves afford a very rewarding study for scientists. Equally, of course, there are plenty of laymen capable of entering to a very large extent into the spirit in which great scientists have gained their victories, even if they cannot fully appreciate the value of these achievements. And since laymen represent the big battalions at the libraries and bookshop counters many of the studies of scientists bear the "popular" label. Rackham Holt's book, which is 99 per cent about the man and 1 per cent about the scientist, is no exception. That George Washington Carver was a practical scientist of a high order is evidenced by the extremely competent analytical activities, illuminated by genius, by which he succeeded in producing 300 products from the American groundnut and more than 100 from the sweet potato. As a plant pathologist and general horticultural scientist in all branches his historical achievements released the American South from bondage to cotton and ruin from the boll weevil and conferred greater benefits than his country has received from any other horticultural scientist.

Recognition, in part, were the awards in 1923 of the Spingarn medal for distinguished service to agricultural chemistry and in 1939 of the Roosevelt medal for service to science. But his greatest reward was to know that he served his community, and not the least remarkable of his achievements was to resist to the end of his life all attempts to commercialise his discoveries. To have been born a negro slave, as George Washington Carver was, and to have wrested a scientific education and honours from the Deep South sounds like a fairy tale. His biographer tells the extraordinary story in that manner and romantically eludes much of the factual evidence upon which this man's great reputation was based.

U.S.S.R. Raw Materials for Czech Chemical Industry.—It is reported that representatives of the Czech chemical industry recently went to Moscow for the purpose of negotiating the supply of raw materials.

(*Continued from p.* 118)

to rebuild the union and we agreed to do what we could to bring this about."

"Progress at first was discouragingly slow because of the widespread ruin and disorganisation of so much of the world. It proved exceedingly difficult to discover in the case of many foreign chemists formerly active in the union whether they were alive or dead and, if alive, where they were living. In the course of this investigation, we learned that one of our former presidents of the union, Professor Ernst Cohen, of Holland, had been murdered by the Nazis in their infamous gas chamber at Oswiecim. Gradually we found out where to reach the surviving chemists we sought and, practically without exception, when approached they approved of what we were endeavouring to accomplish and rallied to our aid.

"I am very happy this morning to be able to tell you that what we started out to accomplish two years ago has largely been achieved. The International Union of Chemistry has been rebuilt and in many respects is stronger than ever. The chemists whose devoted and tireless service has made this possible are the members of our Comité d'Action and the presidents of our various international commissions. Above all, we owe it to Sir Robert Robinson, Sir Ian Heilbron and Dr. Leslie Lampitt in England; in France to Dr. Frederic Joliot, Nobel laureate, Haut Commissaire de l'energie atomique, and our efficient general secretary, Professor Raymond Delaby, president of the Société chimique de France; in Switzerland to Professor Emile Briner, president of the Conseil de la Chimie Suisse; and in Holland to Professor H. R. Kruyt, recently president of the International Council of Scientific Unions."

(*Continued from p.* 120)

industry. These are clear and welcome evidence that the leaders of that industry are showing understanding of the intellectual needs of the men who serve it. One can only hope that the whips of commercial secrecy will not be succeeded by the scorpions of military security.

Looking to the future of chemical research one can confidently foresee an era of great technical progress. The powerful organisations which will ensure this are already in operation. The relevant problems of pure science will also be explored on a scale which has hitherto been undreamt of. Such matters as thermodynamic and kinetic studies on polymers, biological studies on chemotherapeutic agents and scores of others could be cited to show how the approach is changing from the sporadic and the amateur to the thorough and the professional. All this leads to new knowledge of inestimable value, and in this field also progress seems assured.

This raises a practical question of the first magnitude, that of adequate facilities for meeting. I feel a little ashamed that on this great occasion we should receive our guests in alien halls.

Important as buildings may be, our publications are still more so, and in the eyes of posterity the Society of to-day will be judged more by the quality of the work which it publishes than by any other criterion. As the poets tell us the immortality conferred by black ink is greater than that of lofty pyramids or even brass eternal. It has been a sad economy which has lavished money upon so many objects while restricting the means of scientific publication. We must continue to fight this philistine policy and hope that it will pass, never to return.

(The full address will be published in the *Journal* of the Society.)

(*Continued from p.* 110)

100 years, would go on from strength to strength, serving this country and serving the world.

The president of the society, Professor C. N. Hinshelwood, responding, thanked the Prime Minister for the toast. The presence of the head of the Government on that occasion, he said, was a compliment which they all appreciated very much.

Chemistry, he remarked, was a very subtle art, where things were seldom what they seemed. Recalling the first chemical transformation which most of them had seen, he said a little bit of blue litmus paper was taken, something was done to it and it went red. Amid the laughter and applause which followed this, Professor Hinshelwood denied that there was any political implication in this chemical transformation because the litmus could go back just as quickly to the blue.

Society Pot-Bound

He referred to the Chemical Society in its rooms at Burlington House as being pot-bound and, with a sly dig at the Government, said the difficulty in getting extra accommodation was because so much space seemed to be occupied by a growth of a hardy cactus.

Dr. Hinshelwood concluded by saying that chemistry was a tree of knowledge, for good and evil. The powers that it conferred were mighty, and their control was a matter for the general conscience of mankind. We could not, as was sometimes done, blame the scientists for abuses, any more than we could blame, say, the editors of the Oxford English Dictionary for the use of a vocabulary which was supposed to occur near Billingsgate.

Sir Henry Tizard proposed the toast of "The Guests," which was replied to by Lord Samuel and Professor L. Ruzicka.

U.S. CARBON BLACKS

THE failure of rapidly increasing production of carbon black in the U.S.A. to match the expanding demand in 1946 is described in the statement recently issued by the U.S. Bureau of Mines. Carbon black production and sales were in record volumes in 1946, responding to larger demand from all classes of domestic consumers and for export.

Production of 1244 million lb. exceeded the 1945 record by 18 per cent but was below total sales, which expanded 24 per cent over 1945 to 1,269 lb.

As a result, producers' stocks of black declined to 76 million lb. on December 31, 1946, compared with 102 million lb. at the end of 1945. Stocks of contact (channel) type blacks declined throughout the year. Furnace type stocks were built up moderately in the second and third quarters but declined in the fourth quarter. Furnace black production gained 22 per cent over 1945 to 625 million lb. and was greater for the first time than that of contact type blacks—619 million lb.

As the quantity of natural gas consumed in carbon black manufacture increased only 11 per cent in 1946 to 478,349 million cu. ft., the average yield increased from 2.32 lb. of black per 1000 cu. ft. of gas used in 1945 to 2.44 lb. in 1946. The average value at the plants of gas used was 3.02 cents per 100 cu. ft. in 1946 and 2.28 cents in 1945.

Sales to rubber companies increased from 804 million lb. in 1945 to 941 million lb. in 1946 and record quantities of black were taken by ink and paint trades. Although exports of contact types were controlled, exports of all grades increased 56 per cent to the unprecedented total of 271 million lb.

The average value of carbon black at the plants increased from 4.02 cents per lb. in 1945 to 4.82 cents in 1946, as prices of the principal contact grades advanced.

A total of 60 plants operated in 1946, one more than in 1945. One channel plant in Texas did not produce and two new furnace plants (in Texas and Kansas) were put in production.

Chemical Engineering Refresher Course

Production of mononitrotoluenes from nitration-grade toluene (coal-tar origin), nitric acid and sulphuric acid, is to form the subject of a refresher course to be held in Manchester on September 15-17 under the auspices of the N.W. branch of the Institution of Chemical Engineers. The lecturing team, which will be led and co-ordinated by Mr. M. B. Donald, will consist of Mr. C. H. Bowden, Dr. J. M. Coulson, Dr. F. Rumford and Mr. F. A. Warner. Production of saleable products, and the treatment and disposal of the spent acid will be included in the scheme.

ARGENTINE STEEL CO.

THE Argentine Government is understood to have approved the creation of a National Steel Company, styled Sociedad Mixta Siderúrgica Argentina, with an authorised capital of 100 million pesos, of which 80 million would be provided by the State and the rest by public subscription. It is reported that the output of pig-iron from the existing blast furnace at Palpalá in the Province of Jujuy, which uses local mineral deposits, will be thereby increased, while the capacity of the new plant will be approximately 315,000 tons of steel billets per annum, employing imported as well as national supplies of raw material and fuel. It is understood that negotiations are in progress with U.S. interests regarding the installation of the plant, that the Pittsburgh Steel Foundry Corporation is to start construction of a steel rolling-mill in Argentina, and that Argentine technicians are being sent to Pittsburgh for training.

German Scientists for Australia

According to information released in New York by Australian officials, three German scientists and engineers in the chemical industry are going to Australia to do research work in micro-analysis of elements and the gasification of brown coal. The scientists involved are Dr. Frederick Danulat, inventor of a process for the extraction of tar and gas from brown coal; Dr. Erich Bruggerman, chemical engineer and designer of the extraction plant and Dr. Carl Tettweiler, a chemical engineer who has been engaged in outstanding scientific teaching and research work in Germany. Dr. Tettweiler will be lent to the University of Melbourne, where he will be engaged in research work and also give lectures on the automatic micro-analysis of elements, a work new to Australia. Drs. Danulat and Bruggerman will be employed by the Victorian Government for further work on the gasification of brown coal.

Coal Consumers' Councils

The Ministry of Fuel announced this week the appointment of Dame Vera Laughton Mathews, D.B.E., as chairman of the Domestic Coal Consumers' Council, and Sir Ernest W. Smith, the fuel technologist and former president of the Institute of Fuel, as chairman of the Industrial Coal Consumers' Council. Both organisations are set up on the authority of the Coal Industry Nationalisation Act. Dame Laughton Mathews is the former Chief Superintendent of the W.R.N.S. Among the 20 members of the industrial users' organisation are representatives of chemical, glass and metal industries, the railways, gas, electricity and municipal undertakings and the T.G.W. union.

Home News Items

Scottish Perfumes for Export.—Perfumes which the manufacturer, Mr. Robert J. Cowie, claims can be brought to maturity in 20 minutes by a process developed after 10 years' work, will be on show at the forthcoming Enterprise Scotland 1947 exhibition.

Soap Works Visit.—About 100 representatives of industrial firms from South Lancashire, Cheshire, and North Wales visited Port Sunlight on July 15, to attend a meeting of the Merseyside Area Industrial Group of the Royal Society for the Prevention of Accidents, and to visit the soap works of Messrs. Lever Brothers. They were entertained to tea at the Hulme Hall.

Iron and Steel Output.—Iron and steel output in May was reduced by the limitation of fuel supplies. The average weekly output of steel ingots and castings during the month was 244,000 tons, representing an annual rate of 12,684,000 tons (equivalent figures in 1946 were 262,000 and 13,619,000 tons). Pig iron production was at the weekly rate of 142,000 tons, against 151,000 tons a week in 1946.

Atomic Energy Prospects.—The most difficult problem in making industrial use of nuclear energy was the use of radio-active products, said Prof. J. D. Cockcroft, director of the Harwell, Berks., atomic research station, delivering the James Clayton lecture at the centenary celebrations in London of the Institution of Mechanical Engineers. The vast protective shields required forbade at present the economic use of such power for vehicles or aircraft.

Liverpool Mayor at Dunlops.—The first belt to go through the great new belting presses installed at the Dunlop factory at Speke was watched, on July 7, by the Lord Mayor of Liverpool (Ald. W. G. Gregson), who visited the factory with the Lady Mayoress. The presses will provide conveyor belting needed for the mechanisation of coal mines. Over 5000 people are employed at the factory and it is expected that 6000 will be employed by the end of the year.

Inquest on Chemical Worker.—A verdict that death had been caused by "aplastic anæmia" and that there was not sufficient evidence to show how it was caused, was returned by the coroner at a Wrexham inquest on Thomas R. Charles, 62, who was formerly employed in the technical laboratory of the Monsanto Chemical Works, Ltd., Ruabon. He was stated to have helped in a chemical process involving the use of benzol. A superintendent of the company said another man had worked 16 years in the laboratory without suffering any ill effect.

Magnesium for Aircraft.—Magnesium metal is being increasingly used in aircraft production—notably the Essex Aero Company's new "Sprite," of all-magnesium construction—and even wider use is predicted for aero structural work in the future on account of the strength and lightness of the metal.

Rayon Production Up.—Total output of rayon, nylon and similar artificial silk yarns showed a marked rise in May. Output of continuous filament yarn and staple fibre was approximately 16.6 million lb., 9 per cent more than in April and 11 per cent above the average in 1946. The peak figure was reached in January when 17.6 million lb. were produced.

Rail Wages up £22.5 Million.—Railway operating costs will be increased by about £22.5 millions as a result of last week's decision by the court of inquiry appointed by the Minister of Transport that railway workers' wages should be raised 7s. 6d. a week. It was stated for the companies that each increase of £7 million in wages necessitated an addition of 3 per cent in railway charges. The working week was reduced from 48 to 44 hours weekly.

Damages for Chemical Worker.—Damages of £1546 and costs were awarded in an action at Manchester to Henry Cocker, 49, millwright, of Castleton Avenue, Stretford, near Manchester, against the Geigy Co., Ltd., Trafford Park, Manchester, for injuries he received when he was poisoned by dimethyl sulphate in December, 1945. As a result he suffered from bronchitis and skin and eye trouble. The plaintiff claimed that he was advised by Dr. William Osborne, a chemist formerly employed at the works, that it was safe to do the work without wearing a gas-mask or rubber gloves.

Pitchblende in Wales?—The neglected Paris mines at Amlwch, once the most important source of copper in Europe, might yield pitchblende, it was suggested at a recent meeting of the North Wales Development Council at Colwyn Bay. Mr. R. D. Briercliffe said that pitchblende had been found in a copper mine in Europe. He was supporting a request by Amlwch Council that active steps should be taken to bring about the reopening of the Paris mines, which have not been worked for many years. The Council decided to act on the suggestion of Mr. Hugh Jones, clerk to Flintshire County Council, that an approach for information should be made to the Rio Tinto Mining Company, whose engineers examined the mines in the 1930s.

PARLIAMENTARY TOPICS

Dead Sea Millions.—The estimated amount of magnesium chloride available in the Dead Sea, according to estimates made in 1923, was 22,000 million metric tons. If this could all have been marketed at the United Kingdom price prevailing in 1923, the value would have been £143,000 million, but this was, of course, highly fanciful assumption.—Mr. A. Creech Jones.

Linseed Oil Controller.—Sir J. Mellor asked the President of the Board of Trade what persons he proposes to authorise to act on behalf of the board with power to issue or revoke licences under the Control of Paint (Amendment) Order, 1947 (S.R. & O., 1947, No. 1292).—Sir S. Cripps: Dr. G. F. New has been authorised under the Control of Paint (Amendment) Order, 1947, to act on behalf of and under the supervision of the Board of Trade in the issue of licences to paint manufacturers for the acquisition of linseed oil under the Control of Paint, etc. (No. 3) Order, 1942. It is not proposed to extend his authority to any other form of licensing procedure under the order.

Tung Oil Experiment.—Captain W. J. Field asked the Secretary of State for the Colonies what progress has been made in the working of the Tung Oil Scheme in Nyasaland.—Mr. Creech Jones: The scheme is an experimental one to determine whether large-scale development is practicable. It has only been in operation for a year and, considering the remoteness of the area, progress has been satisfactory. Work is in hand on some 500 acres, of which 25 acres have been planted with tung and a further 250 acres have been cleared for planting.

Deficient Coal Rations.—Attention was called by Mr. G. M. Sharp to the fact that not all firms are receiving their industrial fuel allocation and were being compelled to use up stocks they had been ordered to build up for winter. A spokesman for the Ministry of Fuel admitted that the amount provided for in the programme had not been received "by every firm in every area." He gave an assurance that when receipts of a particular firm were below average, action would be taken to increase supplies. He invited particulars of specific cases.

Effect of Strikes.—The total number of man shifts lost through disputes in the coal-mining industry in the 26 weeks ended June 28, 1947, was 311,300. Information is not available which would enable me to distinguish between unofficial and official strikes.—Mr. G. Isaacs (Minister of Labour).

U.S. IRON DEVELOPMENTS

Two methods of increasing iron and steel production—one using high-pressure blowing in blast furnaces, the other oxygen in the refining of steel—were recently described at the annual meeting of the American Iron and Steel Institute. The new pressure-blowing method was developed by Arthur D. Little, Inc., research chemists, who claim that it will increase the iron output of a blast furnace by 20 per cent and reduce its coke consumption by 12 per cent. According to an official of the well-known Republic Steel Corporation, by the blowing of a blast furnace at a rate of 110,000 cu. ft. a minute over a period of six months, output has been increased by 11 to 20 per cent. Further gains are expected after the installation of 125,000 cu. ft. per minute blowers. The changes required in fitting the pressure equipment cost from $70,000 to $150,000, representing about 1 per cent of the total amount invested in a furnace.

It is claimed that the use of oxygen in open-hearth steel refining speeds up the process by 25 per cent. The oxygen, supplied through a 1-in. pipe, is introduced at a rate of 27 to 62 lb. per minute. The installation is said to have cost $500,000.

The delegates generally agreed that they expected the demand for U.S. steel to continue at high levels, with a production rate of over 90 per cent of capacity. Any decline in demand from the building trades would be absorbed by the railway companies and by overseas markets.

Next Week's Events

TUESDAY, JULY 29—THURSDAY 31

Society of Chemical Industry. Annual General Meeting. Tuesday 29—London Section. Royal Institution, Albemarle Street, W.1, 6 p.m. Francis J. Curtis: "Values" (Jubilee Memorial lecture). Wednesday 30—Food Group. The Connaught Rooms, Great Queen Street, Kingsway, W.C., 10 a.m. Dr. D. W. Kent-Jones: "Some present trends and future developments in Baking," Dr. J. G. Davis: "Cheese—What should our policy be?" Dr. J. A. Lovern: "Some present trends and future developments in the Fish Industry," and Dr. D. H. F. Clayson: "Some present trends in the evaluation of Hygienic quality of Ice Cream." Road and Building Materials Group. A. V. Hussey: "Synthetic Bauxite." Plastics Group. 2.30 p.m. Foster Sproxton: "Preparing for Change." Agricultural Group. Dr. M. A. H. Tincker: "Chemical Regulators of Plant Growth." Thursday 31—Chemical Engineering Group. 10 a.m. W. A. Damon: "Experiences of an Alkali Inspector." The Royal Institution, Albemarle Street, W.1, 2.30 p.m. Dr. A. Fleck: "Castner and his Work."

Overseas News Items

U.S. Magnesium Oxide.—With the recent completion of the Pittsfield (Mass.) magnesium oxide plant of the General Electric Company of America, that concern has now doubled its capacity.

U.S. Chemical Output.—According to the June report of the U.S. Department of Commerce, chemical output is insufficient to meet demand, caustic soda, soda ash and several other important products being in particularly short supply.

Swiss Capital for Hungarian Chemical Plant.—Negotiations are reported to be taking place in Switzerland for the erection in Hungary of a large-scale chemical plant with Swiss capital. Eastern European markets would be supplied by the new project.

To Restrict Rubber Output?—An appeal for co-operation with a view to reducing output of natural rubber in Malaya if the U.S. continues to decline to reduce its production of synthetic rubber has been made by the chairman of the Malayan Rubber Estate Owners' Association.

Russian Iron-ore Prospecting.—U.S.S.R. iron-ore prospecting activities this year will be chiefly concentrated in the Karelo-Finnish Republic, in the Ukraine near Kremenchug, in the Urals, and in the Yenissei Mountains of Siberia, where extensive deposits of high-grade ores were found last year. It is reported that these deposits may be of greater importance than the well-known deposits of Krivoi Rog.

France Self-sufficient in Penicillin.—By the end of the current year, according to a statement by the chairman of the Rhone-Poulenc group, one of France's leading chemical and pharmaceutical manufacturers, penicillin production will be sufficiently high to dispense with imports. The company proposes to bring a second plant into operation at an early date, and envisages a production of some 50,000 mega units a month by October.

Montecatini Ousting Farben.—The great Italian chemical combine, the Montecatini works, with headquarters in Milan, hopes to be able to take the place in foreign markets of Germany's onetime great chemical industry. The statement to this effect was recently made by the director-general of this well-known firm, and increased activity of Montecatini in the chemical markets is soon to be expected, especially in the Near East and South America. The German Dye Trust (I. G. Farben) is reported to have held 40 per cent of the shares in the Italian ACNA combine, one of the strongest units in the Montecatini combine.

U.S. ends Export Control on Certain Waxes.—U.S. export controls on unrefined and semi-refined paraffin waxes, slop waxes, and mineral waxes, except ceresins, have been discontinued.

Franco-Belgian Trade.—A trade agreement between France and the Belgium-Luxembourg Customs Union provides, *inter alia*, for the exchange of phosphates from France against iron and steel goods and non-ferrous metals.

U.S. Chemical Production.—According to the president of the Manufacturing Chemists' Association of America, U.S. chemical production is now above the war-time record. Output is reported to be 429 per cent above the average for the years 1935-39, compared with 412 per cent for 1940-45.

Chrome Deposits Discovered in Rumania.—Chrome deposits are reported to have been discovered near Turnu-Severin, the Rumanian river port on the Danube. The ore is said to have a metal content of about 50 per cent, and there may be a total yield of some two million tons of chrome.

Czecho-Russian Chemical Links.—According to recent reports from Prague, the Czechoslovak nationalised chemical industry has sent representatives to Moscow for the purpose of obtaining supplies of raw materials. Concurrent negotiations took place between a delegation from the Czechoslovak salt monopoly company and their opposite numbers in the U.S.S.R.

Egypt's Fertiliser Production Plans.—The Abu Zaabal and Kafr El Zayat Fertiliser and Chemical Company, a company recently formed in Cairo under Royal Decree with an initial capital of £E 325,000, plans to produce about 30,000 tons of superphosphate per annum. Rock phosphates from Upper Egypt will be used as raw material, and employees will number about 100 persons. A sulphuric acid plant with a capacity of 400 tons weekly is also to be established.

Caustic Soda Shortage in Egypt.—Representatives of soap and textile manufacturers, together with spokesmen of other interested industries, have approached the Egyptian Government with a view to increasing imports of caustic soda, at present in short supply. Home production is estimated at 7000 tons per year, whereas 10,000 tons is regarded as the present minimum annual consumption. A new artificial silk mill which is due to commence production soon, and which will require 800 tons of caustic soda this year, will considerably aggravate the shortage unless positive steps are taken immediately.

Franco-Swedish Trade.—Under a provisional agreement covering the four months to the end of October, France is to export bauxite, gypsum, cast-iron products, lead, sodium sulphate, soda ash, potash, etc., to Sweden. In return, Sweden will send machinery, steel, and other traditional products to France.

Synthetic v. Natural Rubber.—A movement to limit the production of synthetic rubber in the interests of natural rubber producers, hit by falling prices, failed after eight days' discussion in Paris by the International Rubber Study Organisation. The U.S.A. representatives are stated to have strenuously resisted the suggested restriction of synthetic production.

Monsanto's Atom Laboratory. — The atomic energy research centre, part of which is underground, which the Monsanto Chemical Co. will operate at Miamisburg, Ohio, U.S.A., is now being constructed. Part of the laboratory is underground in order to obtain special conditions required for certain chemical processes. Complete silence is being preserved as to the design, construction and operation of the plant.

Holland-Bulgaria Trade Agreement.—A treaty has been concluded with the Netherlands and Bulgaria for the regulation of commercial relations and transactions between the two countries. Holland is to supply chemicals, pharmaceutical and rubber products, radio components and seeds, while Bulgaria will send pyrites, timber, opium, tobacco and fruit pulp. Payment will be made in guilders, and the agreement is valid for one year.

Persian Oil Line.—Co-operation of the Anglo-Iranian Oil Company with the Standard Oil Company of New Jersey and the Socony Vacuum Oil Company in laying a 30 in. diameter pipeline from the head of the Persian Gulf to the Mediterranean was referred to by the chairman of Anglo-Iranian (Sir William Fraser) in a statement to stockholders. When completed it will cut by some 3000 miles the distance by which oil has to be carried by sea from the Eastern Mediterranean.

U.S. Steel Production.—The American Iron and Steel Institute reports production of over 72,000,000 metric tons of steel in the past 12 months—over 13,000,000 tons higher than the previous best peace-time year. For the current calendar year the industry anticipates a total of about 76,000,000 tons, *i.e.*, nearly 30 per cent more steel than the U.S. has been able to use in any one year. The last five months have shown an operating rate of more than 95 per cent of ingot capacity, which was equalled only once before in peace-time—in 1929.

Canadian Chemical Exports Up.—Canadian external trade returns show that exports of chemicals and allied products in May, 1947, were worth $7,915,000, an increase of more than $2,000,000 over the exports for May, 1946, which totalled $5,826,000. Exports for the first five months of 1947 totalled $33,530,000 as against $27,855,000 in the same period last year.

Rumanian Oilfields "Purge."—Staffs of British and American oil interests in Rumania, Rumanian nationals, are reported to have been victimised by the present political régime in that country. Many of the key personnel in the oilfields are stated to have been removed, charged in general terms with sabotage and "anti-democratic" behaviour. The present fall in oil output is likely to be greatly accelerated as a result.

Poland Buying Pharmaceuticals. — Polish pharmaceutical chemists are being sent shortly on a mission to the U.K. and Sweden to purchase in Britain £1 million worth of medicines and in Sweden 4 million crown's worth. As a result of an agreement concluded by the Polish Ministry of Health, the Swiss chemical firm of C.I.B.A. will supply chemical products and medicines to the value of 4 million Swiss francs.

West African Groundnuts.—Encouraging telegrams are reaching the Colonial Office from the mission of experts examining the possibility of developing a large groundnuts scheme in West Africa, in Gambia which already has estates, and in Nigeria, the Gold Coast and Sierra Leone. If surveys confirm estimates, the West African scheme might, in full production, supply about one-third of the major plan. Unilevers are associated with the project.

Syria To Buy Laboratory Equipment and Chemicals.—According to information received in the United States recently from the American Legation in Damascus, the Syrian Government is to place a $10,000 order for laboratory equipment and chemicals. Price lists should be sent to Dr. Youssef Khoury, Director of Technical Bureau, Office of Concessionary Companies and Mines, Ministry of Public Works, Damascus, Syria.

Menthol Slump in Brazil.—Because of a severe reduction in U.S. orders, Brazil is finding it difficult to dispose of its large stocks of menthol. During the war, production was greatly encouraged and it is reported that whole communities, in areas served by the Sorocabana and North-Eastern Railways, have become almost entirely dependent on menthol for their livelihood. The price per kilogramme is now back to the pre-war level of 50 cruzeiros, although Japan, an important pre-war producer, has not yet returned to the market.

Personal

DR. D. H. PEACOCK has been appointed lecturer in chemistry at Sheffield University.

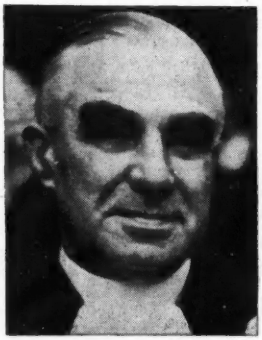
MR. C. COOKSON and COL. A. J. FOSTER have resigned from the board of Goodlass Wall & Lead Industries.

MR. T. C. BETTERIDGE has been appointed a director of Cooper McDougal & Robertson, Ltd., insecticide manufacturers.

SIR EDWARD APPLETON, SIR ALEXANDER FLEMING, and SIR ARTHUR MCNALTY have been elected honorary fellows of the Royal Society of Edinburgh.

The Council of the British Institute of Management has appointed to be the director of the Institute MR. LEO RUSSELL, who is relinquishing a Board of Trade appointment to take up the work this autumn.

SIR FREDERICK WELLS, for 20 years managing director of Sanitas, Ltd., manufacturers of disinfectants and other coal-tar products, may become London's next Lord Mayor. He is now senior among the aldermen who have not sat in the civic chair. He is 63 years of age, and has attained seniority owing to the recent resignation of Sir Charles McRae and Mr. Septimus Marshall.



Sir Frederick Wells

PROF. J. G. SMITH, vice-principal to Birmingham University, has retired after having been in the service of the University for 28 years. His successor as vice-principal is SIR NORMAN HAWORTH, professor of chemistry at the same university.

MR. LESLIE GAMAGE, joint managing director of the General Electric Co., Ltd., has been re-elected chairman of the British Export Trade Research Organisation, for the ensuing year. SIR PERCY LISTER, of R. A. Lister & Co., Ltd., is succeeded as deputy chairman by MR. JOHN RYAN, M.C., of Metal Box Co., Ltd.

PROF. C. N. HINSHELWOOD (president of the Chemical Society), Dr. Lee's professor of chemistry in the University of Oxford, has had an honorary degree conferred upon him by the University of London. The same university has also conferred honorary degrees on the following: PROF. J. N. BRØNSTED, professor of chemistry in the University of Copenhagen; PROF. P. KARRER, professor of chemistry in the University of Zurich; and PROF. L. C. PAULING, professor of chemistry in the California Institute of Technology.

The annual distribution of long-service awards to employees of the Gaskell Marsh group of the I.C.I. was renewed on July 15 at Widnes, when recipients—constituting the first party out of 437 members—assembled at the I.C.I. Recreation Club. Certificates were given to 39 old-age pensioners, and 86 others still working with over 40 years' service who were to receive chiming clocks. Those entitled to gold watches for over 30 years' service number 21. The oldest employees were William Dodd with 53 years, and J. Hewitt with 51 years. Mr. W. H. Palmer, manager, presided. Mr. V. St. J. Killery, chairman of the General Chemical Division of the I.C.I., said he was much impressed by what Widnes had done during the war.

Workers on I.C.I. Board

Unique Proposal Rejected

The July number of *The I.C.I. Magazine* records that at the 23rd ordinary meeting of the Central Council of I.C.I. held in Blackpool recently, Mr. Lyons (Billingham) proposed the election of an employees' representative to the board of directors.

Replying for the board, the chairman (Lord McGowan) said: "There is no such thing as a representative of any body of any kind on the board of I.C.I. to-day. The board of I.C.I. are there for a particular function; they have been selected to perform that function; that is, for direction. They cannot be the delegates nor the representatives of any body; they are not. In my view, industry is one great army and it marches as one army, under its competent leaders. If they are not competent, then there are means of getting rid of them, but there is only one standard and only one test for those who shall direct and lead, and that is their competency to lead. I regard myself as a representative of the workers as much as anybody in this room. I have been a worker; I have been a day man and I have been a shift man; but I would be a very bad and incompetent deputy chairman of I.C.I. if I said: 'I am going to represent a certain class or a certain section of those who are part of what I regard as the finest industrial instrument in this country.'"

The resoution was not carried.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Satisfaction

BAIRD & TATLOCK (LONDON) LTD., chemists. (M.S. 26/7/46.) Satisfaction June 14, of debentures registered May 24, 1932, to the extent of £1000.

Increases of Capital

The nominal capital of **Shell Chemical Manufacturing Company, Ltd.,** St. Helens Court, London, E.C., has been increased beyond the registered capital of £100,000, by £2,900,000, in £1 ordinary shares.

The nominal capital of **Metallurgical Chemists, Ltd.,** 12 Henrietta Street, London, W.C.2, has been increased beyond the registered capital of £500, by £6500, in £1 shares.

Company News

International Bitumen Emulsions has declared a dividend of 15 per cent. The year's profits amount to £28,762 compared with £16,232 for the previous year.

The name of **Rubber Industries and Shermans Chemicals, Ltd.,** 19 Eastcheap, London, E.C.3., has been changed to Rubber Industries and Sherman Chemicals, Ltd., as from May 6, 1947.

Genatosan Trust, a subsidiary of **Fisons,** has increased its capital to £1,297,150 by the creation of 594,300 10s. ordinary shares, in order to acquire the share capital of **Whiffen and Sons,** the Fulham manufacturing chemists.

The nominal capital of **Genatosan Trust, Ltd.,** Investment Trust, Harvest House, Ipswich, has been increased beyond the registered capital of £1,000,000, by £297,150, in 594,300 ordinary shares of 10s. This increase is for the purpose of acquiring the share capital of Whiffen and Sons, Ltd.

The nominal capital of **Monsanto Chemicals, Ltd.,** Victoria Station House, London, S.W.1., has been increased beyond the registered capital of £800,000, by £2,200,000 in 2,200,000 ordinary shares of 10s. and 1,100,000 3½ per cent redeemable cumulative preference shares of £1.

At the recent extraordinary general meeting of **Ciba,** Basle, the leading Swiss chemical and pharmaceutical manufacturers, it was unanimously decided to increase the share capital from 40 to 60 million Swiss francs by increasing the nominal value of each share from 1,000 to 1,500 francs. General reserve was brought up to one-fifth of the share capital, *i.e.*, to 12 million francs. Furthermore, 40,000 shares at 1,500 francs each will be divided into 120,000 shares at 500 francs each. It was also agreed to convert the present bearer shares into name shares. The group's articles of association will be amended in accordance with these decisions.

New Companies Registered

Beverley Manufacturing Company, Ltd. (438,168). — Private company. Capital £3,000 in 3,000 ordinary shares of £1 each. Manufacturers of cellulose and its constituents, sprayers, paints, etc. Directors: L. Tann; U. Bernard; P. Forse and J. J. Vallins. Registered office: 117 Newgate Street, London, E.C.1.

Hartford Products, Ltd. (435,926).— Private company. Capital £100 in £1 shares. Manufacturers of and dealers in chemicals, drugs, disinfectants, fertilisers, plasters, oils, colours, polishes, photographic and toilet requisites, etc. Directors: W. Creasey, and F. C. S. Major. Registered office: 61-3, Cobden Street, Luton.

Watts & Sons (Banbury), Ltd. (438,090). —Private company. Capital £50,000 in £1 shares. Dealers in and agents for grain, seeds, hay, straw, oils, fodder, manure and fertilisers, cattle food and feeding and fattening preparations, patent and other medicines and drugs, etc. Directors: A. P. Watts and R. E. Watts. Solicitors: F. W. Blincowe, Banbury. Registered office: 6/7 Bridge Street, Banbury.

J. and P. Supplies, Ltd. (438,581).— Private company. Capital £1,000 in £1 shares. To carry on the business of manufacturers and importers of and dealers in fertilisers, manures and animal and poultry feeding stuff; manufacturing chemists, manufacturers of and dealers in engineers' requisites and machinery, etc. Directors: H. S. Johnson and Fdk. T. Perrins. Registered office: New Street Chambers, New Street, Stourbridge.

Splendor (Ireland), Ltd. (11,923).— Private company. Capital £10,000 in £1 shares. Manufacturers and repairers of and dealers in all kinds of sanitary, surgical, dental, optical, electrical, chemical and scientific instruments, etc. Subscribers: E. J. Crowley and Wm. J. Walsh, both of 3 Lower O'Connell Street, Dublin.

Chemical and Allied Stocks and Shares

WITH holiday influences more in evidence and international uncertainties also tending to check buying interest, values in stock markets were again inclined to lose ground. A renewed decline in British Funds at the beginning of the week domi-

nated sentiment, but generally movements in industrial shares were moderate, and good features were not entirely lacking.

In accordance with the general tendency, small irregular movements characterised chemical and kindred shares, Imperial Chemical easing to 51s. 7½d., while Monsanto Chemicals 5s. ordinary were 61s. 9d., and Greeff-Chemical Holdings 5s. ordinary transferred around 17s. 3d. B. Laporte have changed hands up to 101s. 3d, and W. J. Bush marked 91s. 3d. Lever & Unilever were active and at one time touched 57s. on rumours that the dividend equalisation agreement with Lever N.V. the Dutch company, might be modified; but later the price eased, this rumour lacking confirmation. United Molasses came back to 55s. 9d. British Plaster Board was steady at 31s., and elsewhere, the units of the Distillers Co. remained active up to 153s. awaiting the final dividend announcement due next month.

Pinchin Johnson at 68s. were good among paint shares, while in other directions, Turner & Newall were firm at 89s. at the beginning of the week. Hardman & Holden 5s. shares were 32s. 9d. Dunlop Rubber were 77s., and Associated Cement improved to 78s. A feature was a better tendency in iron and steel shares on wider recognition that in many cases prices appear to have been unduly depressed by nationalisation uncertainties and that a fair compensation basis in the event of nationalisation would probably be well above current levels. Dorman Long strengthened to 27s. 3d., W. Beardmore to 47s. 3d., Thomas & Baldwins were 13s. 4½d., and United Steel 26s. 3d. Stewarts & Lloyds, however, eased to 54s. 3d., although elsewhere, Babcock & Wilcox have been firm at 77s. Amalgamated Metal remained at 19s. 6d., and in other directions Birmid Industries rallied to 82s. 6d. Borax Consolidated were slightly lower at 59s. 9d., British Aluminium 50s. 4½d., British Match 46s. 3d., British Oxygen 105s. 7½d., and Wall Paper Manufacturers deferred 56s.

Courtaulds eased to 51s. 4½d., and British Celanese were 30s. 4½d., but Bradford Dyers at 22s. 7½d. showed steadiness, Calico Printers were 22s. 1½d., and Bleachers 12s. 3d. Fisons have changed hands around 64s., and British Drug Houses were 63s. Glaxo Laboratories were dealt in actively around £25½. Reflecting the strong position disclosed by the annual report, British Glues 4s. ordinary have strengthened to 20s. 9d.

Boots Drug were 66s. 3d., Griffiths Hughes 56s. 6d., and Beechams deferred 27s. General Refractories eased to 24s. 10½d., and in other directions, Sangers have been steady at 37s. 6d. Low Temperature Carbonisation 2s shares have been active around 5s. 1½d., and among shares of companies with interests in plastics, De La Rue were 60s. xd. There has been considerable activity in Steel Company of Wales 3 per cent debentures, a large part of which was left with the underwriters. Yield considerations are attracting more attention to this stock, which is now £25 paid, and after opening at only 23¾ last week has since improved to 24¾.

Oil shares remained prominent under the lead of Anglo-Iranian, which on further consideration of the annual report advanced to £11 9/16, before profit-taking caused a moderate reaction to £11⅜. Shell and other leading oil shares also failed to keep best levels, and Burmah were affected by the latest Burmese news, but on the other hand, Attock Oil moved higher and Trinidad Leaseholds were inclined to attract attention.

British Chemical Prices

Market Reports

CONDITIONS on the industrial chemicals market continue more or less as reported last week, there being little change in the overall supply position. The home industrial demand is able to absorb any offers that come on the market and export inquiry remains on a considerable scale There has been a reduction of £2 per ton in the quotation for copper sulphate, but the price position generally is unaltered and firm. The coal-tar products market is steady and demand, with a few exceptions, is ahead of current production.

MANCHESTER.—In spite of holiday influences which are now approaching their height, steady trading conditions have been reported on the Manchester chemical market during the past week. Most of the bread-and-butter lines are being called off steadily by the cotton and woollen textile and other leading industrial consumers, and there are still some complaints, but deliveries tend to fall below day-to-day requirements. Export bookings are also coming forward steadily, with shippers pressing for an acceleration of deliveries against orders placed some time ago. Quiet conditions still rule in respect of the fertiliser trade. In tar products, the leading light and heavy products continue to meet with a good demand.

GLASGOW.—During the past week in the Scottish chemical market there has been the usual stocking up prior to trade holidays. The soda ash position which was already very difficult has been further worsened by shortage of fuel resulting in the necessary reduction of supplies to all regular consumers. In the export market, a number of orders have again been booked and shipping position eased. Inquiries continue but on a reduced scale.

Patents in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Chemical compounds and processes of preparing the same.—Merck & Co., Inc. Dec. 15, 1945. 36512/46.

Process for preparing a preparation containing salicylanilide.—Nederlandsche Centrale Organisatie Voor Toegepast-Natuurwetenschappelijk Onderzoek. August 22, 1945. 21965/46.

Device for producing metal compounds by electrolysis.—Sirco, A.-G. Dec. 11, 1945. 36532/46.

Manufacture of phosphoric acid.—Soc. Anon. des Manufactures des Glaces et Produits Chmique de Saint-Gobain, Chauny, & Cirey. April 13, 1945. 21860/46.

Method for desulphurising iron with molten calcium carbide.—Air Reduction Co., Inc. Dec. 8, 1943. 15158/47.

Surface ornament of aluminium and aluminium alloy articles.—Aluminium Co. of America. March 2, 1939. 14764/47.

High density alloy.—Callite Tungsten Corporation. Sept. 30, 1942. 17765-66/43.

Manufacture of new amines.—Ciba, Ltd. Dec. 21, 1946. 36576-77/46.

Manufacture of new hydrazine compounds and derivatives thereof.—Ciba, Ltd. Dec. 21, 1945. 36717-18/46.

Manufacture of new substituted ethylenes. Ciba, Ltd. Dec. 18, 1945. 37278-79/46.

Manufacture of cupriferous azo-dyestuffs. —Ciba, Ltd. Dec. 21, 1945. 37280/46.

Manufacture of new dyestuff preparations. —Ciba, Ltd. Dec. 22, 1945. 37281-82/46.

Process for the electrolytic oxidation of aluminium and its alloys by means of alternating current.—Compagnie de Produits Chemiques et Electrometallurgiques Alais, Froges, & Camargue. Dec. 19, 1945. 36595/46.

Vitreous enamel compositions.—E. I. Du Pont de Nemours & Co. Dec. 18, 1945. 37237/46.

New organo-silicon compounds.—E. I. Du Pont de Nemours & Co. Dec. 19, 1945. 37400/46.

Manufacture of new organo-silicon compounds.—E. I. Du Pont de Nemours & Co. Dec. 19, 1945. 37401-2/46.

Coating compositions.—E. I. du Pont de Nemours & Co. July 31, 1941. 14374/47.

Bleaching of ground wood pulp.—E. I. Du Pont de Nemours & Co. Sept. 29, 1939. 15419/47.

Printing of nylon.—General Aniline & Film Corporation. Dec. 20, 1945. 32876/46.

EDUCATIONAL

Great Possibilities for
QUALIFIED CHEMICAL ENGINEERS

VAST and far-reaching developments in the range of peacetime productions and markets of the Chemical Industry mean that the profession of Chemical Engineering will be of great importance in the future and one which will offer the ambitious man a career of outstanding interest and high status. The T.I.G.B. offers a first-class training to candidates for the Chemical Engineering profession.

Enrol with the T.I.G.B. for the A.M.I.Chem.E. Examinations in which home-study students of the T.I.G.B. have gained a record total of passes including—

FOUR " MACNAB " PASSES
and
THREE FIRST PLACES

Write to-day for the " Engineers' Guide to Success "—free—containing the world's widest choice of Engineering courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE
OF GREAT BRITAIN
219, Temple Bar House, London, E.C.4

SITUATIONS VACANT

CIVIL SERVICE COMMISSION.
SCIENTIFIC CIVIL SERVICE.

APPLICATIONS are invited for a Principal Scientific Officer vacancy in the Intelligence Division of the Headquarters Office of the Department of Scientific and Industrial Research in London.

Candidates should have high qualifications in Chemistry or Chemical Engineering with experience of research and/or works processes in chemical industry.

The officer selected will be required to participate in the general work of the Division, but especially to keep under review scientific discoveries and developments in the chemical field and to promote their examination for potential new industrial applications. Previous experience of co-operation in scientific matters with research organisations of Government or industry would be an advantage.

Candidates must have been born on or before 1st August, 1915, and should preferably be under 45 years of age.

Salary scale (for men): £900 by £30 to £1,080 by £35 to £1,220. In the case of candidates with special qualifications and/or experience, entry to the grade may be at a salary above the minimum of the scale.

The salary scale for women is lower.

Superannuation provision will be made under the Federated Superannuation System for Universities.

Further particulars and application forms may be obtained from THE SECRETARY, Civil Service Commission, 6, Burlington Gardens, London, W.1, quoting No. 1951, and completed applications should be returned to that address not later than 1st September, 1947.

ADVERTISING REPRESENTATIVE required for " THE CHEMICAL AGE " to cover Lancashire and Yorkshire. Previous experience of selling space and some knowledge of the Chemical Industry preferable but not essential. Write giving full details, age, experience, etc., to the Managing Director, Benn Brothers Ltd., Bouverie House, Fleet Street, E.C.4.

CHEMICAL Engineer, degree and institution membership, invited to join firm of Consultants as employee or in partnership. Experience essential in production of acids in heavy chemical industries, distillation processes and recovery. Willingness to seek and develop business. Box No. 2500, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

COUNTY BOROUGH OF BLACKPOOL.
BLACKPOOL TECHNICAL COLLEGE AND SCHOOL OF ART.
Principal: M. W. Garside, B.A., F.R.S.A.
ENGINEERING AND SCIENCE DEPARTMENT.

APPLICATIONS are invited for the post of graduate lecturer in chemistry and related subjects, to commence duties forthwith.

The work comprises evening classes up to the standard of the Ordinary National Certificate in Chemistry, together with various part-time day classes up to Inter B.Sc. level, and some science work in the Junior Technical School.

Experience in both teaching and industry is desirable. Salary will be in accordance with the Burnham Award, with the appropriate allowances for training and experience.

Application forms, obtainable from the Chief Education Officer, Education Offices, 3, Caunce Street, Blackpool, should be returned within 7 days of the appearance of this advertisement.

TREVOR T. JONES,
Town Clerk.

CHEMICAL Engineers required for development department in the Midlands. Qualifications: A.M.I.Chem.E., or equivalent. Age 25-30. Apply Box No. 2499, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CHEMISTS required by well-established London Manufacturing Chemists. Positions offer wide scope and excellent prospects in rapidly expanding sections of the business.

(1) *Research Chemist* to specialise in disinfectant research. High qualifications, up-to-date knowledge and previous disinfectant experience essential. Commencing salary, £1,000 per annum, plus bonus.
(2) *Chief Works Chemist* to control production of disinfectants, household products, cleansers,, etc. Technical qualifications, good previous works experience in disinfectants and a capacity for hard work essential. Commencing salary up to £1,000 per annum.
(3) *Assistant Works Chemist* to understudy Chief Chemist, test raw materials, etc. Previous disinfectant experience and training up to inter-degree standard desirable. Salary according to experience, but applicants should state amount expected.

Give fullest details of age, qualifications, experience and present and former employers, which will be treated in the strictest confidence. Please state for which post you are applying. Write to MANAGING DIRECTOR, Box 2495, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

GENERAL MANAGER required to take sole charge of selling, marketing and office of progressive chemical manufacturers in London producing nationally distributed branded household chemicals. Responsible well paid position for educated man of proved executive abilities and outstanding qualifications with vision and initiative. Write in confidence giving all details to Box No. 2496, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PLANT Chemists urgently required for Process Plant Operation by large company operating in the Middle East. Applicants need not be Graduates but should have had a chemical training up to Inter. B.Sc. or National Certificate Standard with experience of shift work in either a gas, coke oven or chemical works. Age not over 30. Salary in sterling between £540 and £600 per annum, plus generous allowances in local currency, with free furnished bachelor accommodation, passages out and home, medical attention, also kit allowance and Provident Fund benefits. Apply, stating age, qualifications and experience, etc., to Dept. F.22, Box No. 2435, THE CHEMICAL AGE, 154, Fleet Street London, E.C.4.

FOR SALE

MORTON, SON & WARD LTD.
OFFER
HIGH GRADE STORAGE TANKS AND PRESSURE RECEIVERS.
ENCLOSED CYLINDRICAL.

ONE—5000 galls. capacity 24 ft. 0 in. by 6 ft. 6 in. dia. by ⅛ in. plate, riveted.
ONE—1200 galls. capacity 6 ft. 6 in. by 6 ft. 3 in. dia. by ⅛ in. plate, riveted, 100 lb. per sq. in. w.p.
ONE—900 galls. capacity 9 ft. 0 in. long by 4 ft. 6 in. dia. flat ended, welded ¼ in. plate.
ONE—600 galls. capacity 9 ft. 0 in. long by 3 ft. 9 in. dia. dish ended, welded ⅛ in. plate, (Two compartments).
ONE—400 galls. capacity 10 ft. 6 in. long by 2 ft. 8 in. dia. dish ended, riveted ⅜ in. plate, 100 lb. per sq. in. w.p.
ONE—400 galls. capacity 5 ft. 0 in. by 4 ft. 0 in. dia. dish ended, welded ⅜ in. plate, 100 lb. per sq. in. w.p.
ONE—270 galls. capacity 6 ft. 0 in. by 3 ft. 0 in. dia. dish ended, welded with bolted on cover.

OPEN CYLINDRICAL

ONE—1330 galls. 12 ft. 0 in. by 4 ft. 9 in. by ⅜ in. plate, riveted.
ONE—800 galls. 6 ft. 6 in. deep by 5 ft. 0 in. dia. by ¼ in. plate, welded.
TWO—600 galls. 4 ft. 0 in. deep by 5 ft. 0 in. dia. by ¼ in. plate, welded.
TWO—300 galls. 4 ft. 0 in. deep by 4 ft. 0 in. dia. by ⅛ in. plate, riveted.

ENCLOSED RECTANGULAR.

ONE—1600 galls, 9 ft. 0 in. by 6 ft. 0 in. by 5 ft. 4 in. deep by ¼ in. plate, welded.
ONE—1400 galls. 10 ft. 0 in. by 5 ft. 0 in. by 4 ft. 6 in. deep by ⅛ in. plate, riveted.
SEVERAL 1100 galls. capacity enclosed Welded Rectangular Tanks, 7 ft. by 5 ft. by 5 ft. with manhole and bolted on cover.
ONE—1000 galls, 13 ft. 6 in. by 3 ft. 0 in. by 4 ft. 0 in. deep by ¼ in. plate, welded.
ONE—220 galls. 3 ft. 6 in. by 3 ft. 0 in. by 2 ft. 2 in. deep by ¼ in. plate, welded.

OPEN RECTANGULAR

ONE—2500 galls capacity 16 ft. 0 in. long by 5 ft. 3 in. wide by 4 ft. 6 in. deep by ¼ in. plate, riveted.
ONE—400 galls. capacity 4 ft. 0 in. by 4 ft. 0 in. by 4 ft. 0 in. deep by ¼ in. plate, riveted.

MORTON, SON & WARD LTD.,
WALK MILL, DOBCROSS, Nr. OLDHAM, LANCS.
'Phone : Saddleworth 437.

ACID Containers. High quality ebonite containers available from stock. 29 gallons capacity. Dimensions 17½ in. by 13½ in. by 39½ in. high. Suitable for handling and storing liquid chemicals. Price £3 10s. 0d. each. UNITED EBONITE & LORIVAL, LTD., Little Lever, Nr. Bolton, Lancs.

AIR Receivers, 40, dished ends, 4 ft. 6 in. by 22 in. dia. tested 120 lbs. hydraulic, £5 each inspected Hatcham Road, S.E.15. THOMPSON & SON (Millwall) Ltd., Cuba Street, Millwall, London, E.14.

CHARCOAL, ANIMAL, and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Bochurch, London." Telephone 3285 East.

ELEVEN open-ended cylinders, 8 ft. 3 in. by 3 ft. 9 in. dia., ⅜ in. plate, external stiffening rings, suitable for conversion to tanks. THOMPSON & SON (MILLWALL) LTD., Cuba Street, London, E.14.

FOR Sale, one Heat Exchanger or Surface Condenser, with 900 sq. ft. of cooling surface, with Muntz metal headers and gun-metal tubes. Also one Evaporating Plant by Scott's of London. Box No. 742, BLACKFORD'S ADVERTISING, Queen Square, Bristol.

KENT (13 miles London) substantially constructed three-storey building having concrete floors with frontage River Thames. Area 40,000 square feet and land. Site 2½ acres. All services available. Further particulars from LEOPOLD FARMER & SONS, Factory Agents, 46, Gresham Street, London, E.C.2.

METAL Powders and Oxides. Dohm Limited, 167, Victoria Street, London, S.W.1.

FOR SALE

ONE—Visco Filter designed to handle 300,000 c.f. of hydrogen per hour. This unit consists of 2 banks of 7 filters per bank arranged in parallel. Each unit is constructed of cylindrical vessel 4 ft. 3 in. O/D. by 10 ft. deep with conical bottom 6 ft. 5 in. deep. Incoming main, 14 in. dia. opening to two 10 in. branches, each feeding one bank of 7 filters. Outgoing main 16 in. dia. Dust is deposited in pure wool filter bags 8 in. dia. by 9 ft. 2½ in. long, 18 bags per vessel. These are suspended vertically, the area of each bag being 16 sq. ft. Shaking gear is provided at the top and the whole unit is housed in a special building.
ONE—new Sutcliffe Speakman 24 in. double-roller Ovoid Press designed for briquetting magnesium powder at the rate of 4 cwts. per hour, totally enclosed for gas tight operation, fitted with special packing gear. Could be suitable for briquetting metallic powders and similar materials.
ONE—water-jacketed horizontal plunger type Briquetting Press by Dorstener of Germany, fitted with two simultaneously acting pistons for briquetting magnesium powder in a hydrogen atmosphere. Speed 40 strokes per minute. Pressure on ram 12.7 tons per sq. in. Rams 55 mm. dia. output 800 lb. per hour. Screw fed with regulating device and hand-operated intensified pressure through adjustable nozzles of 57 mm. dia. Cooling water arrangement for 600 g.p.h.
ONE—Edgar Allen twin-roll Crusher, rolls 36 in. dia. by 30 in. face with Cromax steel shells, arranged for double V-belt drive from two 20 H.P. motors, capacity 20 tons per hour from 1¼ in. to ¼ in.
ONE—cast-iron tubular Oil Cooler by Hick Hargreaves, 6 ft. 3 in. long by 2 ft. 6 in. dia., with tubes arranged in 5 banks.
ONE—motorised gas-fired Tilting Furnace of approx. 300 k.g. capacity, output 4 tons per day, fitted with Crofts reduction gear and motor; also continuous Chain Moulding machine, 32 ft. centres, having 210 moulds approx. 1 ft. 11 in. long by 3 ft. wide by 3½ in. deep, suitable for casting ingots of magnesium of similar material.

GEORGE COHEN SONS & CO. LTD.
WOOD LANE, W.12.

NEW Stainless Steel Vertical Cylindrical Tanks, 25, 50 and 100 gallon capacity, either with handles, or mounted in rubber castored cradle.
Also Stainless Steel Water-jacketed Pans with similar capacity, arranged for heating by water, oil, gas, electricity or steam.
Also Mild Steel Jacketed Pans for 50 lb. and 80 lb. working pressure, 20/300 gallons capacity.
DELIVERY from stock.
Wanted to purchase second-hand chemical plant—best prices given.

THE MANICRAFT ENGINEERING COMPANY LIMITED
Pryme Street Mills, off Chester Road, Hulme, Manchester, 15.

RED Lead Powder—40 tons available for prompt delivery. Box No. 2501, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

NEW AND SECONDHAND PLANT
Send your specific enquiries
to
REED BROTHERS
(ENGINEERING) LTD.
Chemical Plant Department,
Bevis Marks House,
London, E.C.3.
'Phone: AVEnue 1677/8

FOR SALE

Phone: 98 Staines.

OVAL-JACKETED Vacuum Oven, 7 ft. by 4 ft. 6 in. by 2 ft. 6 in.
Jacketed Vacuum Mixer, 19 in. by 19 in. by 16 in. deep.
20-in. Broadbent Electric Hydro, 415/3/50.
26-in. Belt Driven Hydro Extractor.
6 Wood Rectangular Tanks up to 500 galls.
2 Earthenware Stainless Mixers, 250 galls.
HARRY H. GARDAM & CO. LTD. STAINES.

2 Vertical Stearine Presses
1 Hydraulic Baling Press
1 Shirtliffe Baling Press
48 in. Belt-driven Hydro
42 in. Under-driven Hydro
Jacketed Mixing Pan, 7 ft. dia., 9 ft. deep
7 various Filter Presses
Ball-bearing Gravity Conveyor, 6 in. pitch, 14 in. wide, 8 ft. lengths
12 Vertical Weir & Hall Steam Pumps
Several small Steam-jacketed Copper Pans
Plant and Frame Filter Press, 19 in. square
Three C.I. Sectional Tanks
Several Ball Mills, 6 ft. 6 in. by 6 ft. 8 in., Silex-lined batch type, with driving gear and clutch
Iwel-Laab size 0 Melter, motorised
Porteous size 3 Grinder with Motor
Two set 2-pair high Breaking Rolls, 33 in. long
One 18-in. 4-roll Cake Cracking Mill
One 36-in. dia. Swan Neck Hydro Extractor
Five Large Filter Presses
One Oram Barrel Hooping Press
Rectangular Storage Tank, 128-tons capacity
Ditto, 108-tons capacity
Ditto, 62-tons capacity
Sectional ditto, 16-tons capacity
Steel Sectional ditto, 10-tons capacity
3 Johnson Horizontal Oil Filter Presses fitted 24 plates 36" diameter.
1 Ditto fitted 24 plates 36" square

Write: RICHARD SIZER LIMITED, ENGINEERS, CUBER WORKS, HULL

1000 STRONG NEW WATERPROOF APRONS, To-day's value 5s. each, Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons. Springfield Mills Preston, Lancs. Phone 2198.

SERVICING

GRINDING, Drying, Screening and Grading of materials undertaken for the trade. Also Suppliers of Ground Silica and Fillers, etc. JAMES KENT, LTD., Millers, Fenton, Staffordshire. Telegrams: Kenmill, Stoke-on-Trent. Telephone: 4253 and 4254, Stoke-on-Trent (2 lines).

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone 3285 East.

LONDON FIRM offers complete service packing powders of all descriptions, also liquids and chemicals. Long runs only. Containers and packing cases for home and export, made on premises. Near to docks. Own rail sidings. Box No. 2331, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PULVERISING and grading of raw materials DOHM LTD., 167, Victoria Street, London, S.W.1.

WANTED

ACID Sodium Sulphate (Sodium Bisulphate, Nitre Cake); regular and substantial quantities required. Write Box No. 2490, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CARBOYS-10 Gallon Wanted, Spot Cash. Will be collected. Box No. 2502, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CUP Centrifuge required, preferably 3000 r.p.m. beaker capacity 800 c.cm.-1000 c.cm total, but other size would be considered. Enamelled iron plant of all description required. Price, particulars to Box No. 2498, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

INDUSTRIAL BY-PRODUCTS, LTD., 16, Philpot Lane, London, E.C.3., will be pleased to receive particulars of any by-products, waste materials and residues.

REQUIRED, Chemical Reagent suitable for the purpose of decomposing or oxidising 15 to 20 tons iron scrap per week. This reagent should not affect any non-ferrous metals. Please write, marked "Personal," to MR. H. KLEIN, A. O. Metal Exporters, Ltd., Liverpool House, Eldon Street, London, E.C.2.

WANTED.—Supplies of Nitre Cake in ten-ton lots, Box No. 2126, THE CHEMICAL AGE, 154, Fleet Street. London, E.C.4.

WORKING NOTICE

THE proprietors of British Patent No. 537987, entitled "Improvements relating to the Silvering of Mirrors and the Like," offers same for licence or otherwise to ensure its practical working in Great Britain. Inquiries to SINGER, EHLERT, STERN & CARLBERG, Chrysler Building, New York, 17, N.Y., U.S.A.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers' Valuers and Fire Loss Assessors of CHEMICAL WORKS, PLANT AND MACHINERY
York House, 12 York Street, Manchester.

Telephone 1937 (2 lines) Central, Manchester.

Printed in Great Britain by THE PRESS AT COOMBELANDS, Ltd., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4, 26 July 1947. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.